



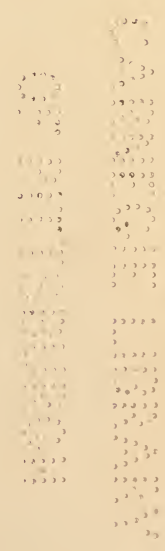




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VOL. CVIII.



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JULY, 1894.

ON THE RELATIVE VALUES OF THE VARIOUS SURGICAL
METHODS OF TREATING UTERINE FIBROIDS.¹

BY W. T. LUSK, M.D.,
OF NEW YORK.

THERE is nothing which in an equal degree marks in gynecology the boundary line between the old order of things and the new as the recent discussions upon the surgical treatment of uterine myomata.

Not many years ago we preached to a patient with a myomatous growth the virtues of fortitude and resignation; we comforted her with figures showing the statistical frequency of the disease, and with the assurance that it was not "malignant;" and we held out the hope that the progress of the tumor would be arrested by the occurrence of the climacteric. Now when we compare these sterile beginnings with the present completeness of our resources we realize, as never before, the possibilities that lay hidden twenty years ago under the teachings of Lister.

Perhaps no achievement in surgery has ever borne witness so completely to the triumph of human ingenuity over anatomical difficulties as the safe extirpation of the enlarged uterus; and it is with special pride that I am able to point to the highly creditable part played by members of this Society in bringing the operation to its present perfection. But in the midst of the new hopes and enthusiasms awakened by recent records of successes in the field of hysterectomy there are a number of important questions which, in the heat of debate, have been treated in a step-mother fashion. Now it is my hope that I may be ful-

¹ Read before the American Gynecological Society, Washington, May, 1894.
VOL. 108, NO. 1.—JULY, 1894.

filling a useful function if I call attention to certain of these, and ask concerning them the expert opinions of the representative men I have the honor of addressing.

Thus it has seemed to me, in following the reported triumphs of the past three years, that certain features in the biology of fibromata ought not to be forgotten. For instance, we are all agreed, I think, at least those of us who have been engaged in general practice (for the pure specialist is apt to see only cases that have exhausted the resources of the general practitioner), that myomata may remain of small size for many years, or for a lifetime; or in rare instances they may diminish in size or even disappear without treatment. In the latter category Albert Doran¹ reports thirty-seven cases. In thirteen spontaneous disappearance followed pregnancy, in six disappearance was associated with inflammations, and in eighteen cases (ten preceding and eight cases subsequent to forty-five years of age) there was no parallel circumstance to which the change could be attributed. So, too, Vineberg² has reported notes of a case of a fibro-myoma which entirely disappeared after a single curettement.

If, therefore, the uterine growth is of small size and the pain and vesical discomfort are slight, is it not good practice to delay a little, and to control, if need be, an attendant menorrhagia by the curette, by the tampon, by ergotin, or by the methods of Apostoli?

The argument in favor of more radical measures, because of the supposed liability of myomata to malignant changes, especially in patients nearing the climacteric, clinically has not much weight. Kleinwächter³ reported a few years ago the case of an elderly maiden lady who carried a fibroid forty years, which at the end of that time became carcinomatous. Quite recently Geier⁴ has collected ten cases of primary carcinomatous degeneration of myomata; but of these he regarded only four as beyond question. There were, however, forty-six cases which had been reported of the simultaneous, but independent existence of carcinoma and myoma—i. e., as was to have been expected, the one condition does not serve as a prophylactic against the other.

Of the palliative measures, the curetting unquestionably furnishes the greatest number of disappointments. Semb,⁵ in an article based upon the analysis of twenty-two cases, reaches the conclusion that the hemorrhages associated with myomata are due less to changes of the

¹ Albert Doran: "On the Absorption of Fibroid Tumors of the Uterus, with the Report of a Suspected Case," *Trans. Obstet. Soc., London*, 1893, p. 250.

² Vineberg: *N. Y. Journ. Gynecol. and Obstet.*, September, 1892.

³ Kleinwächter: "Zur Biologie der Fibro-myome des Uterus," *Ztschr. für Geb. und Gynäk.*, Bd. xxv. p. 164.

⁴ Geier: *Centralblatt f. Gynäk.*, April 7, 1894, S. 341.

⁵ Semb: "Ueber das Verhalten der Uterus-Schleimhaut bei Myomen," *Arch. für Gynäk.*, Bd. xlvi. S. 200.

endometrium than to the enlargement and increased vascularity of the uterine walls.

In the early winter I saw with Dr. Bryant a patient suffering from excessive menorrhagia, caused by a submucous fibroid of about the size of an infant's head. The cervix was dilatable, and the tumor could be readily reached and explored by the finger. The woman was fifty-three years of age, and was so reduced by hemorrhages that she could not turn in bed without assistance. First the curette and then galvanism were resorted to, but without avail. Both Dr. Bryant and myself then advised hysterectomy, though the enfeebled condition of the patient compelled us to give a guarded prognosis. The husband, however, declined to sanction any operative measure. As a means of temporary relief, therefore, I employed daily, first, a combined uterine and vaginal tampon of iodoform gauze, and then a vaginal tampon only. By this means the hemorrhage was arrested. At the end of eighteen days the treatment was discontinued. Three months have since elapsed. The patient is at present in the enjoyment of excellent health; the hemorrhages have ceased, the cervix has closed, and the tumor has diminished to half its size.

In a series of investigations concerning the origin of fibroids, made in the early stages of this growth, Gottschalk¹ concludes that the nucleus is furnished by changes in the convoluted portions of the uterine artery. He agrees with Virchow, Gusserow, and Winckel that every form of local irritation which produces continuous circulatory disturbances acts as a predisposing cause.

The growth of the tumor is largely peripheral, and is maintained by the vessels distributed over the outer surface. He believes that both in preventive and curative treatment profit can be derived from the fact that myomata thrive only in hyper-nourished tissues, and have their origin in close connection with the arterial vessels. In the early stages he recommends, therefore, the ligating of the uterine arteries through the vagina. In September, 1892, at the International Gynecological Congress, at Brussels, he reported three cases treated in this way. In one the tumor had disappeared altogether; in the two others there had been a marked diminution in size; and in all the improvement in the general condition had been very decided.

In December, Franklin Martin, without knowledge of Gottschalk's work, read a paper before the Chicago Gynecological Society, advocating the vaginal ligation of the uterine arteries, and reporting two cases in which the experiment had been tried. Since then he has operated upon six additional patients. In all the results have been most satisfactory. He writes me (April, 1894), "the tumors have all been markedly

¹ Sigmund Gottschalk: "Ueber die Histogenese und Aetologie der Uterus-Myomen," *Arch. für Gynäk.*, Bd. lxiii. S. 534.

reduced in size; the hemorrhages have ceased; the pressure-pains have been relieved." Boldt¹ has likewise reported a case where a tumor the size of a hen's egg had entirely disappeared eight months after ligation.

Now it seems to me unwise bigotry to ignore such testimony because the vaginal ligation of the uterine arteries belongs in the domain of little things. The fact that to a woman the loss of her generative organs is attended with a sense of personal inferiority ought never to be lost sight of in gynecological practice. No woman likes to feel that she is "different" from others, and she cares nothing for the statistics of the successful operator.

In this connection the question arises whether sufficient attention has been paid in this country to the large amount of efficient work that has been accomplished abroad in connection with the enucleation of fibroids by the vaginal passages.

Of course, I do not mean to ignore the valuable work upon the same lines by Drs. Atlee, Sims, Emmet, Thomas, and others at home; but it is to the extension of the method, and to the relative safety with which it can now be performed that I would particularly call attention. Chrobak² alone reports forty-three cases with only one death. The tumors were cervical, submucous, and interstitial. They varied in size from a child's fist to a child's head. From his most interesting paper I gather the following details: The cervix needs to be dilated sufficiently to admit volsella forceps and a guiding finger—sufficient dilatation for two fingers is convenient but not indispensable. The uterus should be drawn down to the pelvic floor by volsella, which should seize the cervix as high up as the vaginal junction. The tumor should then be grasped by volsella forceps, the capsule should be divided, and the enucleation should be proceeded with by the finger, aided, if need be, by blunt-pointed scissors. Where difficulty is experienced in extracting the tumor through the cervix it can be elongated by a series of clippings upon opposite borders, or by a spiral incision around the growth. By either method a tumor the size of the fist can be converted into a body not unlike an apple paring.

After reading Chrobak's report I had occasion to try the method upon a patient suffering from a submucous fibroid the size of a large orange, which was situated at the fundus. The patient was greatly reduced by pain and hemorrhages. The enucleation was effected by one finger and with blunt-pointed scissors. The operation was a slow one, lasting about an hour and a half, but seemed to require for its successful performance

¹ Boldt: "Ligation of the Uterine Arteries for the Cure of a Fibro-myomatous Tumor of the Uterus," N. Y. Journ. Gyn. and Obst., Feb., 1894, p. 129.

² Chrobak: "Ueber die Vaginale Enucleation der Uterus-Myomen," Sammlung klinische Vorträge, Neue-Folge, No. 43.

little more than patience and a determination to succeed. The patient is now a well woman, in the possession of all her organs.

I have thought it worth while to refer to this case because, while Edebohls and Dudley, at the time I showed the specimen to the members of the New York Obstetrical Society, related similar histories from their own practice, the patient, before visiting me, had previously consulted one of our most skilful and conservative gynecologists, who declared that relief could only be secured by abdominal hysterectomy.

The operation is, of course, applicable only to tumors of small size. It would be contra-indicated in multiple and subserous fibroids, by inflammatory conditions, and in fixation of the uterus by old adhesions. Great care needs, therefore, to be taken in the prefatory diagnosis. Not only should careful bimanual examination, best under ether, be employed, but the cervix should be sufficiently dilated to permit the most thorough digital exploration of the uterine cavity. Nor is it to be forgotten that the good results which have restored the method to favor are due to aseptic methods. During the operation nearly continuous irrigation of the uterine cavity should be employed, and at its completion the emptied sac should be carefully packed with iodoform gauze.

Doubtless more ready access to the tumor may be obtained by a resort to the plan devised by Péan. Instead of preliminary dilatation, he advises a circular incision through the vaginal walls above the cervical attachment, high separation of the cervix from the surrounding tissues, with avoidance, however, of the peritoneum; arrest of hemorrhage by forcipressure, and bilateral incision of the cervix, or, if need be, of the lower uterine segment. The anterior and posterior portions are then seized, each with volsella forceps, which serve as a means both to draw the uterus downward and to separate the flaps in such a way as to expose the tumor to be operated upon to the sight as well as to the touch. The fibroid should then be removed entire, or by "morcellement." Afterward the cervix and surrounding tissues may be restored *ad integrum* by familiar plastic methods.

There is no doubt that the plan of Péan is "surgical," but in the absence of reassuring statistics it would seem open to question whether the indications would not be met with greater safety to the woman by a resort to hysterectomy.

When radical measures are deemed necessary it seems to me that, where practicable, vaginal hysterectomy should take precedence of the abdominal form. While granting that much can be accomplished by the perfected technique of the finished operator to lessen the objections to abdominal section, we all know that there are drawbacks inseparable from the method. It may seem a little thing, but every woman dislikes the disfigurement of the cicatrix. The newer devices for approximating the cut surfaces diminish the frequency but do not guarantee against the

occurrence of hernias. Thus, in Jacob's clinique, there were 259 cases, with 38 hernias, 12 of which later required operation. Gollet had 93 cases, with 16 hernias, 11 of which required operation. Similar reports are received from every source where statistics are kept on a large scale and conveniences exist for following up the later histories of those who have been subjected to *cœliotomy*. Even those of us who feel quite sure that the accident does not occur in our own practice have often performed the secondary operation upon the patients of others. Again, along the line of the incision there are always adhesions of the omentum and intestines to the abdominal wall. By the vaginal method better drainage is secured, the recovery is more rapid, and the patient is spared the shock and abdominal distention due to prolonged handling and exposure of the intestines to the air.¹

But the results of vaginal hysterectomy in the treatment of fibroids are especially remarkable. Landau² reports 38 cases operated upon by Richelot, with one death; 28 cases by Doyen, with one death; 22 cases by Jacobs, with no death; and 300 cases by Péan, with 6 deaths, or on the part of experienced operators 8 deaths in 388 cases. It is impossible to ignore such a showing. No matter how expert the *cœliotomist* may have become in his own line he must give his attention to the latest improvements in scientific surgery. At first it would seem strange that a method which can boast such successes should have received scant attention from American gynecologists. In the past the hesitation has probably in part been due to a latent incredulity, to the need of an extensive new equipment, and to the fact that a method which requires to be constantly adapted to varying conditions lends itself imperfectly to written descriptions. Henrotin and Engelmann, after witnessing Jacob's work at Brussels, at the time of the Gynecological Congress, in 1892, returned complete converts.

For tumors of median size, vaginal hysterectomy appears to offer every advantage. The various devices for reducing the size of the uterus from below, viz: morcelllement, conoidal excision, and enucleation extend its capabilities almost indefinitely. Yet it is questionable whether there is an advantage to be gained by substituting the vaginal for the abdominal method in tumors of larger growth. The operation then becomes a lengthy one, is attended with considerable risk, and possesses repellant features in marked contrast with the beautiful technique of an abdominal hysterectomy.

When the tumor much exceeds in size a child's head, experience teaches that it is, as a rule, advantageous to attack it from above. When the abdominal cavity has been exposed, and the tumor is of medium size,

¹ Landau: "Ueber Abdominale und Vaginale Operations verfahren," *Arch. f. Gyn.*, Bd. xlv., p. 103.

² Landau: *Loc. cit.*, p. 131.

the question of castration is a legitimate one, though in the last two years it has been the fashion to discredit it.

Baldy¹ expresses the modern feeling when he says: "The uterus is a useless organ in all cases where the ovaries and Fallopian tubes have been removed, and is only too frequently a source of discomfort, invalidism and death." But in the treatment of fibroids it must be acknowledged that it can be made to serve the useful though humble function of a stop-gap, and some of us have been less unfortunate than he in the subsequent ills castration has entailed upon our patients.

Martin,² who was one of the first to abandon the removal of the ovaries in the treatment of uterine fibroids, has been more guarded in the statement of his reasons. He prefers hysterectomy because he regards the removal of the *materia peccans* as more correct in principle. He had noticed too, that in instances where the ovaries and tubes had been removed for other causes, menstruation sometimes persisted, and that hemorrhages and the growth of the fibroid sometimes continued after the climacteric, but in the seven cases in which he resorted to castration for fibroids he states that he was "certainly contented with the results."

Münchmeyer,³ writing from Leopold's clinic, like Martin, is disturbed in castration by the roundabout method of attaining his ends. Yet castration he found was usually followed by benefit, and lasting benefit, too. Failures he attributed to the incomplete removal of the ovary owing to the existence of extensive adhesions.

Cholmogoroff,⁴ while advocating total extirpation as a method of choice, agrees that castration is usually successful, though it may fail because particles of ovary are left behind.

Leopold⁵ reports twenty-four cases which survived the operation. In twenty-two menstruation was immediately suspended. In one it continued for several periods. In one, a case of cervical fibro-myoma, it persisted, but was diminished in amount. In nearly all the cases shrinkage of the tumor was noted.

From Gusserow's clinic Neidhardt⁶ reports 38 recoveries from the operation. Amenorrhœa was produced in 36 cases (in four after several recurrences of the menses). The myomata had diminished in size in 30 cases. In 29 instances the patients expressed themselves as feeling perfectly well. In 2 cases only no improvement was experienced.

¹ Baldy: "Hysterectomy—Indications and Technique," Amer. Journ. Obstet., 1892, vol. xxviii, No. 5.

² Martin: "Ueber Myomoperationen," Zeitschrift f. Geb. u. Gyn., Bd. xx, S. 9.

³ Münchmeyer: "Ueber die Endergebnisse und weitere Ausdehnung der Vaginalen Total Extirpation der Gebärmutter," Arch. f. Gyn., Bd. xxxvi, S. 424.

⁴ Cholmogoroff: "Ueber die Anwendung, der Vaginalen Total Extirpation des Uterus bei interstitialen Fibromen," Zeitschrift f. Geb. u. Gyn., Bd. xxvii, S. 56.

⁵ Leopold: "Die Operative Behandlung der Uterusmyome," etc., Arch. f. Gyn., Bd. xxxviii, S. 29.

⁶ Neidhardt: Resultate nach Castration der Frauen bei Myomen des Uterus. Berlin, 1893.

Mendes de Léon reported 19 cases to the International Society of Gynecology and Obstetrics. Two were of recent date. Of the other 17 the results in 16 were satisfactory.

Lawson Tait returned 327 histories of castration for myomata. From later reports from the patients, or from their physicians, he learned that 311 were relieved of their distressing symptoms.

While writing upon this subject five of my own patients accidentally have called upon me. All had been operated upon because of large tumors. I asked them eagerly how far they were suffering from "discomfort or invalidism;" but they all insisted that they felt very well.

Of course hysterectomy may be the method of the future. Castration is no longer advocated in large tumors, in cystic tumors; and there is a question as to its value in tumors occupying the lower zone, which are mainly fed by the uterine arteries. It should not be attempted where, owing to extensive adhesions, the removal of the ovaries cannot be made complete. Under favorable conditions, extirpation complete or partial, is probably the wiser course; but cases will occur where excessive anæmia, a feeble circulation, or the length of time needed to separate adherent viscera, may incline the operator to the milder procedure; or, *crede experto*, he may take to heart the kindly warnings of the Coryphei that hysterectomy is not for tyros, and then may derive comfort from the knowledge that it is not necessary to entertain too gloomy a view concerning the outcome of castration.

In all cases where the abdomen has been opened the question of the possible saving of the uterus and its appendages ought never to be lost sight of. All pedicled growths should be tied and removed. Martin, who, like Polk with us, has taken a leading part in urging conservative pelvic surgery, reports in the last edition of his *Frauen-Krankheiten*, that up to the end of 1892 he had employed enucleation as a sequence to cœliotomy in 139 cases, with a loss of 26 patients (11.5 per cent). The death rate, to be sure, is heavy, but many of the fatal cases were due to the defective indications incident to a novel operation. Thus, in 24 instances, the uterine cavity was opened, and in 8 of these death occurred. In 72 instances, where the uterine cavity was left intact, there were 10 deaths; but 5 of the operations were performed upon pregnant women. While a subserous fibroid of medium size can be usually removed with minimal risk to the life of the patient, and with complete relief to her sufferings, it would no longer be thought wise to employ enucleation in pregnancy nor in tumors of large size which involve the uterine area to any considerable depth. A relapse occurred in only 3 of the 113 recoveries. Forty-six per cent. of the number were unmarried, and 27 per cent. were past 40; but pregnancy occurred in two of the cases, and the normal functions were preserved in all.

But after other methods have been weighed there will always remain

cases where the size of the tumor, where cystic degeneration, where the multiplicity of the growths, where the situation in the pelvic cavity, or between the folds of the broad ligaments, make it necessary to remove the uterus from above where every step in the operation can be controlled by the guidance of the eye.

For a long time, under conditions requiring hysterectomy, the extra-peritoneal treatment of the stump was the favorite one. Among those who have operated by this method on an extensive scale may be mentioned Keith, Bantock, Péan, Hegar, and in this country Price. The mortality rate has been low, and yet by nearly all its leading advocates the method has now been abandoned. Fritsch stated the experience of most of us when he reported in 1891 to the Berlin Society of Obstetrics and Gynecology that many of his so-called cured patients returned later with small fistulæ which were, if anything, worse than the former tumors. If this secondary difficulty and a tiresome convalescence can be avoided by exceptional skill and good fortune, there is no reason why the plan should fall from favor. It is easy; it is attended at the time with little shock, and with rigid asepsis recovery is to be expected.

And yet to those of us who regard complete recovery by the extra-peritoneal method as due more to Divine blessing than to the skill or foresight of the surgeon, the paper read before this Society by Prof. Polk, in 1892, giving a plan of procedure for the complete extirpation that could be followed by ordinary mortals was nearly the most welcome contribution that has been made to gynecology during the last ten years. In referring especially to Polk's paper it is, of course, not necessary to remind members of this Society of the notable contributions to the same subject that were made at an earlier period, and contemporaneously by Eastman and Krug; but it may be claimed, I think, without being invidious, that it was Polk's paper which made the operation easy for those of us whose thoughts had not been equally engaged in studying the technical details of the operation.

It was with special delight we greeted the dawn of the new day when we could live at peace together freed from the contention as to the proper treatment of the stump. But the end has not come yet. A little more experience has forced us all to admit that complete hysterectomy is a more severe and more mutilating operation than supra-vaginal amputation. It may be surgically more correct to remove every vestige of uterine tissue. Still if, thanks to Goffe, to Dudley, to Baldy, to Baer, and to Byford, honored members of this Society; if to Zweifel, to Treub, to Chrobak, to Brennecke, and to Doyen, each in his own way, by closing the peritoneum from above, can leave the vaginal stump without detriment to the patient, considerations of her welfare must in the future make the retro-peritoneal treatment of the stump the method of election. Reports as to the late history of patients thus treated are awaited by us all at this meeting with the greatest interest.

CLINICAL REPORT OF TWO CASES OF RAYNAUD'S DISEASE.¹

BY FREDERICK P. HENRY, M.D.,
OF PHILADELPHIA.

CASE I.²—Patrick M., aged fifty-five years, native of Ireland, laborer, was admitted to the Philadelphia Hospital, November 11, 1893.

Family history. The patient's father died at sixty-five, of asthma, and mother at seventy-five, of "old age." Two brothers have died—one at thirty-five, of unknown cause, and the other at twenty-two, of smallpox. Three sisters died in childhood, of measles and smallpox. Two brothers still living and healthy. He knows of no hereditary disease in his family.

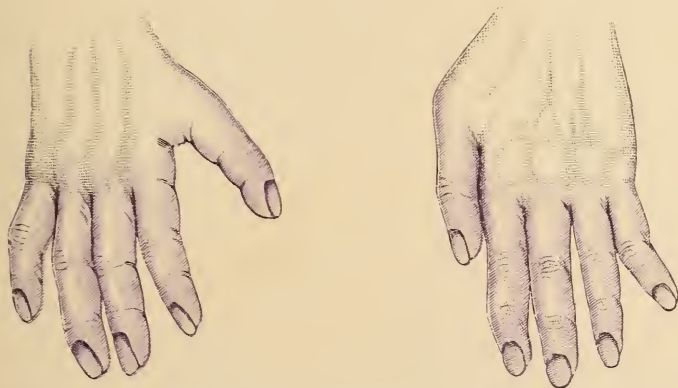
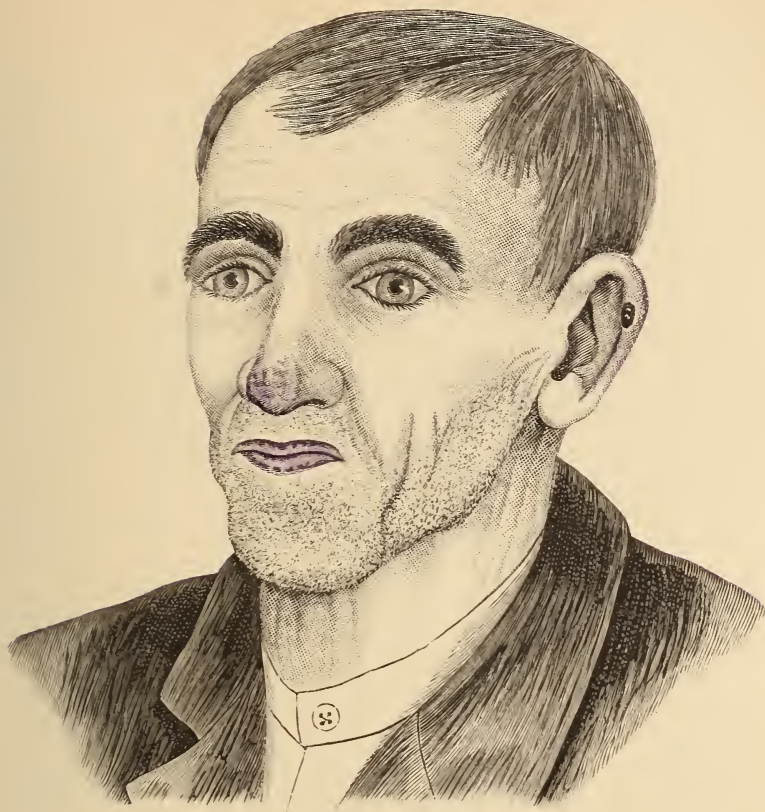
Previous history. He had smallpox and measles in infancy, malarial fever at eight years of age, doubtful left-sided pleurisy twelve years ago. Has used alcoholic liquors in moderate amount, averaging from two to three glasses of beer daily, but would occasionally drink to excess. On the other hand, months would sometimes pass without any indulgence in either beer or spirits. The patient has never had any kind of venereal disease. For the past six winters he has been subject to a severe cough, which has regularly caused the loss of a few pounds in weight. During the spring and summer the cough disappeared and the loss of weight was regained. The summer of 1893 was an exception to this rule. In January, 1893, he acquired a "cold," which has been with him ever since. The cough occurs in paroxysms most severe in the morning, and is attended with a yellowish, scanty, and tenacious expectoration. There has been neither hæmoptysis nor night-sweats. In August, 1893, the patient noticed that his urine was of a deep-red color during the forenoon. This bloody appearance of the urinary secretion was present almost continuously for about one month, but varied somewhat in intensity. One morning in October, 1893, after the patient had been much exposed to cold, he noticed that the helix of both ears was of a deep-blue color. This discoloration continued about two hours, during which the ears felt cold and were painful. Since the last-mentioned date these attacks of local asphyxia have recurred on each exposure to cold. At first the signs of circulatory disturbance were more marked in the right ear, but later the left ear became the more involved, and about December 15th a small portion of the border of its helix became gradually converted into a dry, black sphacelus.

December 25, 1893. The tip of the nose became cyanotic early in the morning on exposure to cold, and has presented the same appearance nearly every morning since. On January 20, 1894, the second and third fingers of the right hand as far as the metacarpo-phalangeal joints became deeply cyanosed on exposure to cold in the morning. This "local asphyxia" has extended to the remaining fingers and to the first phalanx of the thumb of the same hand, but did not at first involve the left hand.

The blood was examined by the resident physician, Dr. Préfontaine, on February 9, 1894. Number of red corpuscles, 2,900,000; hæmo-

¹ Read at the meeting of the Association of American Physicians, Washington, May 29, 1894.

² For the notes of this case I am indebted to Dr. Louis Préfontaine, resident physician.



CASE I.—Patrick M., showing cyanosis (local asphyxia) of hands, nose, and ears, and gangrenous patch in left ear.

globin, 43 per cent; white corpuscles not increased in number. No tubercle bacilli could be detected in the sputum.

February 10, 1894. The patient was exposed for a few minutes to the morning air in order to make him more fully illustrative of a clinical lecture on Raynaud's disease which I delivered at the Philadelphia Hospital at 10 o'clock. The experiment was highly successful, the helices of both ears, the tip of the nose, the fingers and pulp of thumb of the right hand, and the three first fingers of the left hand becoming deeply cyanotic and remaining in the same condition for nearly an hour. At 3.30 the same afternoon he passed four ounces of urine of a deep cherry-red or reddish-brown color, which reacted imperfectly to the guaiacum test for blood pigment.

11th. Cyanosis of ears and nose.

12th. Cyanosis of ears and nose. At 9.30 voided three ounces of reddish-brown urine, which did not respond to Gmelin's bile test, but gave the reaction to Mahomed's test, and contained a few red blood-corpuscles. In the afternoon the urine was of normal appearance, but contained about 7 per cent. of albumin, roughly estimated. Its specific gravity was 1021.

13th. Urine still darker than that of yesterday morning, reacting similarly, and containing a very few red corpuscles. It also contained a few short, rather broad hyaline casts stained with pigment. Albumin, 35 per cent. by volume. The afternoon urine was perfectly normal in appearance and gave similar reaction; it was free from casts and contained about 9 per cent. of albumin; specific gravity, 1023. The cyanosis this morning was comparatively slight.

14th, 9 A.M. Urine brownish-red, but not so dark as yesterday, acid, no bile reaction, no blood-cells or casts; contains a few large, flat epithelial cells; albumin abundant, apparently 30 per cent. by volume; quantity voided too small for specific gravity test; free from sugar. A specimen sent to Prof. Marshall, of the University of Pennsylvania, at 12 o'clock was of a faint brownish-red hue; much lighter than in the morning; no blood-cells in specimen; did not respond to bile test; free from casts; specific gravity, 1030; reaction acid; albumin, 15 per cent. by volume; free from sugar. *2.30 P.M.* Urine amber colored; no sediment; specific gravity, 1027; acid; a trace of albumin; no bile or sugar present; no casts found under the microscope.

15th. Cyanosis slight and limited to ears and nose. The urine passed at 7.30 A.M. was of normal appearance, free from sediment, of specific gravity 1020, and contained no albumin, casts, or blood corpuscles. It was acid and free from sugar. *11 A.M.* Urine brownish-red, precisely like that passed at 12 o'clock the day before; sediment slight; specific gravity, 1026; acid; contains 15 per cent. by volume of albumin; free from casts, blood-cells, and sugar. A specimen sent to Dr. Marshall. *3.30 P.M.* Urine of a cherry-red tint; acid; specific gravity, 1025; distinct ring with Heller's test; no cells or casts. *7.45 P.M.* Urine normal in all respects; specific gravity, 1021.

16th, 9.30 A.M. Urine of same color as specimen voided yesterday at 11 A.M., and similar in all other respects. *12.30 P.M.* Urine darker than at 9.30; acid; specific gravity, 1027; free from blood-cells and casts; contains about 12 per cent. by volume of albumin. *3.40 P.M.* Urine entirely normal in appearance; free from albumin, casts, and cells; specific gravity, 1022. This morning the cyanosis was slightly marked on

the nose and ears and absent from the fingers. It persisted, however, longer than usual, being as well marked at 5 P.M. as at any time during the morning. The weather was quite cold. To day Dr. Marshall sent the following report: "The spectroscope fails to show the presence of blood-coloring matter in Patrick M.'s urine."

17th, 7.30 A.M. Urine normal. 10 A.M. Urine of light-brownish tint; acid; specific gravity, 1022; no reaction with Mahomed's test; no casts; trace of albumin. Cyanosis is very slight to-day, affecting mostly the left ear, point of nose, and right ear, and absent from the hands. 4 P.M. Urine normal in all respects.

18th. Urine shows no change to-day; cyanosis slightly less than yesterday and in same areas.

19th. Urine normal in color and free from casts, cells, and albumin, although the cyanosis was more pronounced than yesterday in the ears and nose, and was perceptible in the fingers for a short period in the morning between 8.30 and 8.50. On the patient's rubbing his hands briskly it disappeared.

21st. The patient was allowed to go out on a pass for forty-eight hours. On his return he reported that on the morning of the 22d, which was very cold, his toes up to the metatarso-phalangeal joints were deeply cyanotic, as well as his nose and ears. His urine also was red during the two mornings of his absence from the hospital.

24th. A cold morning, but the patient keeps himself warm near the heater, so that the cyanosis is but moderate and limited to the nose and ears. The urine is normal in color, acid, of specific gravity 1023, and contains neither albumin, casts, nor blood-cells.

The urine was examined almost daily up to March 16th, when the patient left the hospital. It is unnecessary to give the details of these examinations, since they are precisely similar to those above recorded. The cyanosis was of daily recurrence, but varied greatly in severity and extent; on the other hand, the albuminuria was markedly intermittent, being invariably present when the urine was of a deep brownish red hue, and greatly diminished or absent when it approached or reached the normal color. The contradictory results of the examination of the urine for blood-coloring matter are inexplicable. The gross appearances of the secretion during the paroxysms of "local asphyxia" were precisely those of hæmaturia or hæmoglobinuria, and yet no absorption bands were perceived on spectroscopic examination. On the other hand, on several occasions the reaction of blood was obtained with the guaiacum test. As is well known, the late Dr. Mahomed, of London, claimed that this test would show the presence of hæmoglobin when the spectroscope failed to detect it. He stated, however, that it was not applicable to urine which responded to the ordinary tests for albumin. In the case of Patrick M. the spectroscope failed to detect blood-coloring matter, and yet in the same specimen, which was highly albuminous, the guaiacum reaction for blood was distinct. On February 23d I took a specimen of the urine to Prof. Henry Leffmann, who kindly examined it and sent me the following report:

"I made several experiments to-day with that sample, and got the guaiacum reaction for blood-coloring matter very plainly. I rendered the liquid acid by acetic acid, which, of course, caused much effervescence and produced a flocculent precipitate. This precipitate gave the

blood reaction very strongly. I found that neither reagent alone nor when mixed, without adding some of the sample, gave any color."

Dr. Leffmann's examination of the urine with the spectroscope gave negative results.

A specimen was also examined by Dr. Cattell, assistant pathologist to the Philadelphia Hospital, who reported that it reacted in thirty seconds to Almen's test for blood-coloring matter.

When I went on duty at the Philadelphia Hospital on February 1st I found Patrick M. in a ward assigned to phthisical patients. It has already been mentioned that tubercle bacilli were not found in his sputum. I examined his chest with the utmost care, and found neither dullness on percussion nor any auscultatory sign of consolidation or cavity. Sonorous râles were audible all over the chest, and were more marked during expiration, which was prolonged. The thoracic expansion amounted to only one inch and a half, the chest measuring at the height of a forced inspiration thirty-six inches, and at the end of a forced expiration thirty-four and one-half inches. There was a distinct history of attacks of paroxysmal dyspnoea for several years past, and taking this into consideration with the physical signs just mentioned, I concluded that the condition of the lung was one of moderate emphysema, dependent upon asthma and associated with chronic bronchitis. This history of previous asthmatic attacks which, I repeat, is confirmed by existing signs of emphysema, is extremely interesting, inasmuch as it demonstrates a tendency to spasm of unstriated muscle in other tissues besides the arterial.

The heart, it should be stated, showed no signs of disease.

On March 16th the patient left the hospital and gave a false address, so that my efforts to keep him under observation were thwarted. A few days before he left, the necrosed portion of tissue dropped from his ear, leaving a clean-cut semilunar loss of substance in the helix.

On April 13th, he came to my office and reported that he had been very poorly since leaving the hospital, especially during the recent cold and damp weather. The left ear was of a dark-purple color, but contained no gangrenous patches. The nose, right ear, and hands were of normal appearance. I examined his blood with the following result:

Number of red corpuscles per cubic millimetre, 3,166,666; hæmoglobin, 60 per cent; white corpuscles not increased in number. The patient passed about two ounces of turbid, deep reddish-yellow urine, which was acid, of specific gravity 1030, and contained a trace of albumin (Heller's test). It was free from sugar. This sample was examined for blood-coloring matter by Dr. Leffmann, but with negative results.

CASE II.¹—Elizabeth R., aged seventy-seven years, born in Maryland, a widow, formerly occupied with indoor and outdoor farm work. Her mother died at fifty years of age of some acute disease characterized by flooding and vomiting. Two sisters died from the results of miscarriages; two brothers died of pleurisy, and two children of pulmonary phthisis. She had excellent health in early life. Since the age of twenty has had chronic rheumatism, recurring every winter in the right shoulder and arm. There are nodosities in certain of the phalangeal joints. She has had frequent attacks of gastro-intestinal disturbance which she terms

¹ From notes taken by Dr. Lucas, resident physician.

cholera morbus. No history of malaria or syphilis can be elicited. She has never been addicted to the use of alcoholic liquors. At the time of the menopause she had a severe uterine hemorrhage, and has since, at long intervals, been troubled with metrorrhagia. The patient has been troubled with local symmetrical disturbances of circulation for the past twelve winters. For a longer time than this, however, the end of her nose has been rough during the winter months and discolored (purplish) when cold.

In the winter of 1881-82, while exposed to a cold wind, the helices of both ears became painful, and when she reached home it was noticed that they were swollen and black. This painful and discolored condition of the ears has recurred each winter. For the past two winters there have been symmetrical areas of cyanosis upon the cheeks, which, upon exposure to cold, become very blue and painful. In December, 1893, after an attack of influenza, the signs of local asphyxia reappeared in the old areas of invasion, and similar disturbances of circulation manifested themselves on the backs of the hands, the wrists, and the lower forearms. At the same time large elongated bullæ appeared on the inner side of each foot, running parallel with the first metatarsal bone and extending the greater portion of its length, and one on the outer malleolus of the left foot. It was on account of the last-mentioned lesion that this patient was admitted to one of the surgical wards under the care of Dr. John B. Deaver. One of the resident physicians who had seen Patrick M. (Case I.), and who knew of my interest in the subject of Raynaud's disease, informed me that, in his opinion, there was a case of the affection in one of Dr. Deaver's wards. I found his diagnosis correct, and on applying to Dr. Deaver the case was transferred to me. I take great pleasure in expressing my thanks for the opportunity of studying this case to Dr. Deaver, and to his assistant, Dr. Kleinstuber.

Condition on admission to medical ward, March 2, 1894. The patient's general complexion is decidedly pale. The skin of the end of the nose, including an area about the size of a nickel, is thickened, indurated, and verrucous, and surrounded by a cyanotic border. On both cheeks are several large copper-colored spots arranged with almost absolute symmetry, and well represented in the sketch which I pass around for inspection. Precisely similar spots are to be seen on the dorsum of the hands, the wrists, and the forearms. The helix of each ear is swollen, blue, and tender, and contains a small black area of necrosed tissue. Upon the inner side of each foot there is an elongated red spot which indicates the former situation of the bullæ above mentioned. On the outer malleolus of the left ankle there is a cyanotic area, in the centre of which is a shallow, granulating ulcer about the size of a half-dollar. The discolored areas above mentioned are all increased in size and deepened in color in the early morning when the temperature of the ward is comparatively low. The urine has shown nothing abnormal, although repeatedly examined for albumin, sugar, casts, and blood. The patient, however, claims to have passed urine at times resembling milk, at other times as dark as coffee. Careful physical examination has revealed nothing abnormal with lungs, heart, liver, or other internal organ. An examination of the blood showed the number of red corpuscles to be normal, and their percentage of hæmoglobin to be 75. They presented no noticeable alterations of size or shape. The white cells were not increased in number.

May 17. During the last month fresh gangrenous spots have developed in the ears (there are now three in each) and there are complaints of pain when the temperature falls but a few degrees. Both ears are more cyanotic than formerly. In other respects the patient's condition is unchanged.

These cases are typical examples of the affection described by Maurice Raynaud in 1862,¹ and since classified under the head of Raynaud's disease. When clinically complete, the affection is characterized by great pallor and coldness of peripheral parts, such as the fingers, toes, nose, and ears, on exposure to cold, followed by intense venous congestion of the same parts, and eventually, if the circulatory disturbances continue, by well-defined areas of dry gangrene. These are the essential clinical features of the disease, but, in addition, hæmoglobinuria, as in Case I., and scleroderma, as in Case II., have been observed in a few cases. Raynaud's thesis contains a report of twenty-five cases, of which twenty were of the female sex. The disease is most prevalent in early life, the great majority of Raynaud's cases occurring between the ages of eighteen and thirty. The same observer noted five cases of the disease in children between three and nine years of age. He, therefore, suggested the term "juvenile gangrene" as an appropriate one for the affection, but it is objectionable because it might be supposed to imply that the disease is limited to the young. Both of the cases I report are of individuals decidedly advanced in life.

A perusal of Raynaud's thesis makes it evident that he regarded gangrene as an essential feature of the disease, at least in its full development. The first chapter of his treatise, which contains forty-four pages and occupies more than one-fourth of the whole work, is devoted to what he terms spontaneous gangrene.² Nevertheless, among the twenty-five cases which it contains there are several in which the process did not eventuate in gangrene, but stopped at the stage of "local syncope," or "local asphyxia." It is evident, therefore, that the minor grades of the disease, the *petit mal*, so to speak, of this arterial spasm, to which renewed attention has been recently called by S. Solis-Cohen,³ were thoroughly recognized by Raynaud. This is shown, besides, more explicitly in the introductory remarks of his thesis, in which occurs the following:

"My ambition would be rather to demonstrate that certain facts of gangrene of the extremities which one meets at long intervals in practice, and of which the strange appearance is apt to disconcert the most skilful, are in reality much less singular than one would be tempted to believe, and can be connected by intermediate steps with other facts

¹ De l'Asphyxie locale et de la Gangrène symétrique des Extrémités. Paris, 1862.

² It is headed "Quelques Considérations sur la Gangrène spontanée."

³ "Vasomotor Ataxia," AMER. JOURN. OF THE MEDICAL SCIENCES, February, 1894.

much more common, and which only escape attention by their everyday occurrence."¹

The chief theories of the cause of Raynaud's disease are: (1) that it is due to an endarteritis obliterans; (2) that it is due to peripheral neuritis; (3) that it is the result of vascular spasm. The last is the theory of Raynaud himself.

The early age of many of the patients, the intermittent character of the symptoms, and the great rarity of the disease as compared with endarteritis, suffice to exclude the latter as a causative factor in its production. There can, I think, be no doubt that cases of symmetrical gangrene occasionally reported as examples of Raynaud's disease have an anatomical basis in endarteritis obliterans, but they are in my opinion spurious. A case of the kind referred to is reported by George W. Jacoby,² of New York, and is highly interesting from several points of view. The patient, a male, aged forty-two years, first applied for treatment on account of numbness and coldness of the fingers (local syncope). This was followed by local asphyxia of the same parts, and subsequently by gangrene, the entire third phalanx of the left medius eventually sloughing away. Later, the signs of interstitial nephritis (albuminuria, urine of low specific gravity, casts, hyaline and granular, and hypertrophy of the left ventricle) appeared, and about four years after he was first attacked the patient died in an apoplectic seizure. In this interesting case it is probable, as Jacoby states, that the primary lesion was an arterio-capillary fibrosis, which gradually invaded the vascular system, attacking the vessels of the kidney later than those of the hands.

Jacoby gives the notes of another case in which the asphyxia was limited to the hands, and in which a cure was effected by a prolonged course of anti-syphilitic treatment. The cause of the condition was, presumably, a syphilitic arteritis.

There is little to support the theory that peripheral neuritis is the cause of Raynaud's disease. In the first place, the rarity of the latter and the frequency of the former militate strongly against it. Secondly, the cases in which neuritis has been found post-mortem may be examples of mere coincidence, or, more probably, the neuritis was secondary to the local circulatory disturbance. A degree of asphyxia sufficient in its severe forms to produce gangrene might, in its lighter grades, readily lead to degenerative and inflammatory changes in the nerves of the affected part.

The theory of arteriole spasm is certainly the one that is most in accordance with the clinical phenomena. The disease is most prevalent in females and in the young—*i. e.*, in those whose vasomotor system is most impressible. It occurs in paroxysms which are caused by the

¹ Barlow's translation of Raynaud's Thesis. New Sydenham Soc., 1888. vol. cxxi.

² New York Medical Journal, Feb. 7, 1891.

surest exciter of vascular spasm—cold. Finally, in several cases during the paroxysm there has been dimness of vision, which was shown by the ophthalmoscope to depend upon a contraction of the central artery of the retina and its branches, and in one recently reported by H. M. Thomas¹ the attacks of local syncope were followed by a chill, loss of consciousness, and convulsions. Such facts are in the highest degree corroborative of Raynaud's view, that the disease known by his name is due to an "enormous exaggeration of the excito-motor energy of the gray parts of the spinal cord which control the vasomotor innervation."

The symptom, hæmoglobinuria, occasionally observed is best explained by the theory of vascular spasm. The origin of the hæmoglobinuria may be twofold: it may be due to excretion of hæmoglobin that has been separated from the red corpuscles in the peripheral asphyxiated parts—nose, ears, and fingers—or it may be due to an asphyxia of the renal or other internal vessels. I incline to the latter view as most applicable to Case I., and for the reason that the hæmoglobinuria was the first symptom in the case. It will be recalled that the deep-red color of the urine attracted the patient's attention in the *summer* of 1893, about two months before the peripheral asphyxia was observed.

I freely acknowledge, however, that the facts are in favor of the view that in the majority of cases in which hæmoglobinuria is observed this symptom is dependent upon an excretion of hæmoglobin which has been separated from the red corpuscles in the peripheral asphyxiated parts. Hæmoglobinuria coinciding with hæmoglobinæmia of the blood of the asphyxiated fingers has been frequently observed.² On the other hand, hæmoglobinæmia may exist, and probably often does, without hæmoglobinuria. An instance of the latter kind is reported by Taylor and Colman.³ The patient was a girl, ten years of age, who was subject to attacks of dead finger (local syncope) affecting the distal phalangeal joints. "Local asphyxia" was never observed. In blood withdrawn from the finger during an attack the liquor sanguinis was distinctly colored, while the red corpuscles were shrivelled and irregular in shape and many of them devoid of hæmoglobin. Neither hæmoglobinuria nor albuminuria was ever present. I regret that a more thorough examination of the blood taken from the fingers during the stage of asphyxia was not made in the first of my cases. It was examined but upon one occasion and nothing abnormal was detected. It is probable that hæmoglobinæmia is frequently present without hæmoglobinuria. The spleen and liver are capable of storing up large quantities of hæmoglobin; in fact, according to Ponfick, it is not until the separated hæmo-

¹ Johns Hopkins Hospital Reports, vol. ii.

² For example, by A. T. Myers: Trans. Clin. Soc. London, 1885. Boas: Deutsch. Archiv für klin. Med., 1883. Bristowe and Copeman: Trans. Med. Soc. London, 1889.

³ Trans. Clin. Soc. London, 1890.

globin amounts to one-sixtieth of the total amount in the blood that hæmoglobinuria occurs. Until the hæmoglobinæmia has reached this degree, the attack, so far as the urine is concerned, is only manifested by albuminuria. It seems to me probable that paroxysmal albuminuria in other affections than Raynaud's disease may be but a symptom of a comparatively mild grade of hæmoglobinæmia.

The relation between Raynaud's disease and chilblains has been recently studied by Legroux,¹ and is worthy of further investigation. As this writer tersely remarks, chilblains do not come at will,² a predisposition is essential to their production, and he raises the question whether chilblains, local asphyxia, and symmetrical gangrene may not represent different degrees of a necropathic dystrophy, of which the most striking example is furnished by syringomyelia.

To those who have seen at least a single instance of Weir Mitchell's disease (erythromelalgia) it seems scarcely credible that it should have been confounded with the affection of Raynaud. Nevertheless, this has been done. I will content myself with stating here that the differences between them are radical.³

I have said nothing about the treatment of these cases because no systematic treatment was pursued in either of them. With the exception mentioned in the report of Case I., they were protected from cold and nourished as well as circumstances permitted. It was expected that with the approach of milder weather their condition would improve, and this expectation was fulfilled. It was my intention to test in one of the cases the effect of the electrical bath as recommended by Barlow and R. Glasgow Patteson,⁴ and in the other that of the continuous administration of glonoin in small oft-repeated doses.

My report is nothing more than it pretends to be—a clinical one. I have made no attempt to analyze the numerous recorded cases, still less to separate the spurious among them from the genuine. Raynaud's disease is a paroxysmal affection, and, therefore, cases in which peripheral gangrene has followed injury of the part affected or has gradually supervened upon an obliterating endarteritis, as well as those in which the stages of local syncope and local asphyxia have been absent, are, to say the least, to be regarded with suspicion.

¹ *Annales de Dermatologie et de Syphiligraphie*, 1892, tome iii.

² "N'a pas des engelures qui voudra."

³ For the differential diagnosis between these diseases the reader is referred to Dr. Weir Mitchell's article on "Erythromelalgia," in the *Medical News* for August 19, 1893.

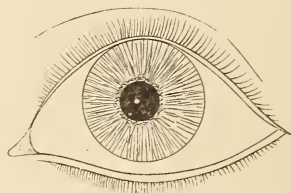
⁴ *Dublin Journ. Med. Sci.*, vol. xciii.

ON THE VALUE OF OPHTHALMOSCOPIC CORNEAL IMAGES.

BY ERNEST E. MADDUX, M.D.,
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WHEN an eye is illuminated by reflection from an ophthalmoscope, a brilliant spot of light appears to rest on the cornea, produced, in reality, by reflection from its surface as from a strong convex mirror. This is shown in Fig. 1. The beginner in ophthalmoscopy is only too well

FIG. 1.



To show the corneal image in an average eye; the pupil displaced slightly inward, and the corneal image displaced still more inward.

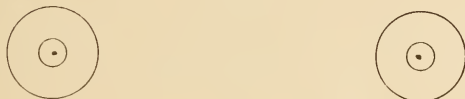
acquainted with this spot, which gets in his way whenever he attempts to explore the fundus. It is well, therefore, to know its powers for good as well as evil, and that in a variety of ways the very same reflection can be turned to good account. A corneal image produced by light reflected from a perforated mirror, such as that of an ophthalmoscope, affords far greater precision in the clinical investigation of the position of an eye than a corneal image formed in any other way, provided attention be given to one or two simple details. The first of these details is to insure that the patient's attention is directed at least to the mirror, and preferably to its central aperture, while the light is flashed on to first one eye and then the other.

Under these conditions, the visual axis of each observed eye coincides in turn with the visual axis of the observer's eye, and the spot of light maps out with very fair precision the point in each cornea which is traversed by the visual axis of that eye.

Under no other conditions does it do so, so that, unless the patient looks at the aperture of the mirror, corneal images produced by the ophthalmoscope possess no advantage over those produced by, for instance, holding a lighted match before the eyes, or making the patient look at the window. Suppose a patient appears to have a slight squint, and we do not know whether it is only apparent or real, the question is at once decided by flashing the light first on to one eye, then on to the other.

If the corneal images occupy symmetrical positions in the two corneæ, as in Fig. 2, no squint exists, and the cause of an apparent squint will at once be evident from the fact that the corneal image in each eye will be found to occupy an unusual position, showing that the visual axis traverses the cornea at an unusual point, thus producing the appearance of a squint. Suppose, again, that a patient complains of total blindness in one eye, without any visible changes to account for it. If we find the corneal images are sufficiently unsymmetrical to prove the existence

FIG. 2.



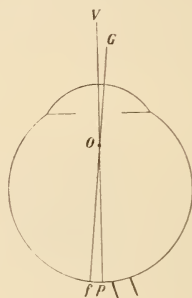
of a slight squint, this would afford strong evidence of the blindness being real. A large squint would be no evidence, but the slighter the squint the greater the evidence, for the more easily would the diplopia be overcome were binocular vision to exist.

In one such case I found the test of great value in furnishing evidence that a monocular blindness was not, as at first suspected, feigned, but real, for patients have no voluntary power for suppressing the desire for fusion. Again, with babies the test is of special service, for though they cannot, of course, fix the central aperture, they cannot help gazing at the bright light from the mirror, which answers almost as well, and then by *rapidly* flashing the light from one eye to the other, it is easy to see, not only whether any deviation exists, but also which is the squinting eye. To be expert, a little practice is necessary, but the same is true of every method of examining the eyes. Many a doctor's perplexity in the endeavor to solve an anxious mother's query about her child's eyes would be at once dispelled if these corneal images came to the rescue. It is a matter for surprise that they have not come into general use long ago.

When the vision of babies is imperfect, or the two eyes do not work well together, it is easy to find whether each eye possesses the power of central fixation by observing whether each corneal image occupies what I have called the "fixation position" with steadiness. This leads me to describe the "fixation position," and mention the second precaution to be observed—namely, to allow for the angle alpha and its variations. The very name of this angle is apt to frighten the unmathematical reader, since it is generally only spoken of in connection with physiological investigations, but it can very easily be turned to the simplest clinical uses, without carrying the reader into needless refinements. We will, for simplicity, suppose that the eye has only two axes, as in Fig. 3, viz., the geometrical axis and the axis of vision, and explain these briefly:

The geometrical axis (G) is the axis on which, so to speak, the eye is built, passing from the centre of the cornea in front to the posterior pole of the eye behind, and passing, on its way, through the centres of the various media. With this axis, however, the axis of vision (V) does not coincide, for, curiously enough, we do not see straight out of our eyes, but obliquely out of them.

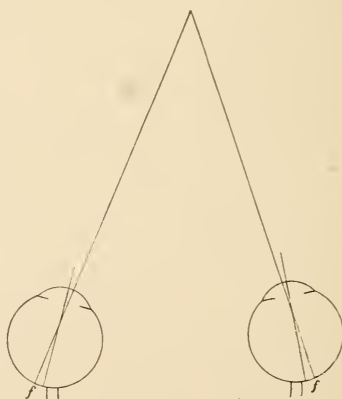
FIG. 3.



This is due to the fact that the "fovea centralis" (f) does not lie exactly at the posterior pole of the eye (p), but slightly to its outer side and below it.

Consequently, the axis of vision intersects the geometrical axis at the optical centre (o) of the eye, as shown in Fig. 3, where for simplicity

FIG. 4.



To illustrate how each visual axis traverses the cornea to the inner side of its centre;
drawn to scale one-half life size.

the two nodal points are reduced to one, and then traverses the cornea to the inner side of its centre. In consequence of this, the corneal image,

visible while the patient looks at the centre of the ophthalmoscopic mirror, and which, as we have already said, maps out on the cornea the point of its transit by the visual axis, appears to the inner side of the centre of each cornea. (See Fig. 4.) The average angle between the two axes is, in emmetropia, 5° . In hypermetropia the angle is greater, the average given by Donders being nearly 8° , and in myopia it is less, sometimes even negative, the average given by Donders being less than 2° .

In consequence of these differences, hypermetropic eyes appear slightly divergent, and myopic eyes slightly convergent, and hence arise the two well-known varieties of "apparent squint." The apparent position of the corneal image on the cornea, while the centre of the mirror is fixed by the patient, might, as already mentioned, with advantage be called the "fixation position" of the image. We have seen that in emmetropia the fixation position is to the inner side of the corneal centre; in hypermetropia it is still further to the inner side, because the angle alpha is greater; in myopia it is less to the inner side, or even, in some cases, slightly to the outer side of the corneal centre, because the angle alpha is smaller, or even negative. In emmetropia the most common condition is, as represented in Figs. 1 and 2, for the pupil to be slightly to the inner side of the centre of the cornea, and for the corneal image to be again slightly to the inner side of the centre of the pupil. It is important, however, to note any anomaly in the position of the pupil, lest it should mislead, and if the pupil be misplaced, the position of the image in the cornea should be studied rather than its position in the pupil. In an eye free from nystagmus, and which possesses the power of central fixation, the corneal image occupies the fixation position with great steadiness. If central fixation, however, be lost, the image is seen to wander aimlessly about the cornea, though really, of course, it is the cornea itself which wanders.

Mr. Priestley Smith has made a very interesting observation that in tobacco amblyopia the power of central fixation is retained, while in some cases of retro-bulbar neuritis it is lost. An absolute scotoma involving the macula would, of course, destroy it, and it might very likely be abrogated by functional or organic changes at the macula, produced by looking at strong light, or by constant use of the microscope, etc. With a little practice, it is quite easy to surmise from the corneal image alone whether an eye is much hypermetropic or myopic, and I have pointed out elsewhere that a high angle alpha, as indicated by an unusually incentric corneal image, should, in an apparently emmetropic eye, make us suspect the presence of latent hypermetropia and induce us to paralyze the accommodation. It may, perhaps, be well to explain that, since the cornea acts as a strong convex mirror, any image which is formed by reflection from its surface is, of course, a virtual image, the

distance¹ of which behind the cornea depends on the distance of the flame, and the position and shape of the mirror, but in practice the depth of the image need not concern us, and we may regard the cornea, the pupil, and the image as all in one plane.

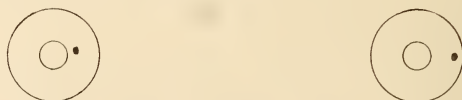
The nodal points of the eye do not always lie in the geometrical axis, and this would, of course, affect the angle alpha, but clinically this consideration also can be waived. The existence of the angle alpha was first proved by Senff, Helmholtz, and Knapp, and its increase of magnitude in hypermetropia and decrease in myopia were subsequently demonstrated by Donders.

Its character in astigmatism does not appear to have been studied fully yet. In some cases of hypermetropic astigmatism in which the deficient curvature was horizontal, I noticed a greater angle alpha than in emmetropia.

For exact measurements Helmholtz's ophthalmometer would be necessary, but that transports us out of the clinical field into the physiological. The beauty of ophthalmoscopic corneal images is that we are able, as it were, to actually *see* in a moment what point of the cornea is traversed by the axis of vision (see Fig. 4 again), and by the distance at which this point lies from the centre of the cornea to guess approximately the amount of the angle alpha. Any instance of an unusually high or low angle at once strikes us, and should set us to try and account for it by looking for some abnormal condition of refraction, excentric fixation, or unusual shape of the eye.

The clinical recognition of the angle alpha is, I believe, the key to the successful use of ophthalmoscopic corneal images, and it is this which

FIG. 5.



To show the asymmetry of the images when the eyes look away from the mirror, though the eyes are not squinting—illustrating how *not* to use corneal images.

makes me enforce the necessity of the patient's attention being directed to the mirror, and, if possible, to its central aperture, since, then, in normal eyes two images are equally displaced inward, and, therefore, symmetrical (Fig. 2). If the *same* eyes be allowed to wander to one or other side, the images will, of course, appear unsymmetrical, for one will be nearer the edge of its cornea than the other, by a distance equal to the combined original inward displacement of each. (Fig. 5.) The

¹ The cornea is a mirror whose "principal focus" lies 4 mm. behind its anterior surface, and, therefore, about the plane of the pupil.

vertical element of the angle alpha, shown by the corneal image lying slightly above the horizontal diameter of the cornea, seems of less clinical importance, and it is often imperceptible, though its amount is also subject to variation; I have not devoted much attention to it.

It is very pretty to see how faithfully the corneal image occupies its correct "fixation position" in cases of lamellar cataract not quite large enough to fill the pupil, even though the image appears to lie opposite the most opaque portion of the cataract. The visual axis, therefore, traverses the cataract, as, of course, it should do, on simple optical principles. Similarly, in cases of very peripheral iridectomy for occluded pupil, and when the iris is drawn to one side as in old cases of prolapse, the corneal image still occupies its proper position, though against an opaque background, and demonstrates, perhaps more prettily than anything else could do, the fallacy of supposing that a peripheral iridectomy predisposes to strabismus, or alters the relations between convergence and accommodation.

Now let us consider a difficulty in the detection of strabismus by corneal images which arises very occasionally. The angle alpha may be different in the two eyes, so that the corneal images appear unsymmetrical. The asymmetry in these cases is, however, so slight that its very smallness leads us to suspect its true cause, and if we place the hand over each eye in turn, it will be found that the "fixation position" is not the same in each. A "monolateral" squint is one in which the same eye always fixes and the other always squints, in contrast to an "alternating squint" in which either eye fixes indifferently. In squints of high degree it is most easy to determine whether they are alternating or monolateral, without the aid of corneal reflections, by simply covering the fixing eye for a few moments, so as to make the other one take up fixation instead; if the latter continues to fix when uncovered, the squint is alternating, but if fixation is at once transferred back to the originally fixing eye, the squint is "monolateral!" With minute squints, however, it is not so easy to settle this point without the aid of corneal images which enable us at once to see which is the fixing eye, and whether by covering this eye temporarily fixation can be transferred to the other. A still more important point to settle is that of "concomitancy," because by this alone can we tell whether or not a squint is *paralytic*. In paralytic squint the degree of strabismus increases on looking in the direction of action of paralyzed muscle, whereas in concomitant squint the degree remains the same in whatever direction the patient looks. The following method is one which I can thoroughly recommend: Lay the palm of the left hand on the patient's head, with instructions to let the head follow the most gentle guidance of the hand without resistance. Now note the exact position of the corneal reflex on the squinting eye, while the fixing eye is directed to the central

aperture of the mirror, and steadily turn the head to the right and left, up and down, and into intermediate positions, to notice whether the position of the reflection is unchanged by these manœuvres. If it is unchanged, the squint is concomitant; if otherwise, the squint is paralytic, provided that the movements made are not too great to bring in the fallacy of mechanical impediment from one of the corneæ reaching almost to a canthus. Vertical squints are just as easily detected as horizontal ones. The last use of corneal images which I shall describe in this paper is one which I have sometimes found of value, viz., to test for binocular fixation when its existence is doubtful.

Binocular vision and binocular fixation are often assumed to be identical; but the latter may, at least hypothetically, be supposed to exist without the former, since the seat of binocular vision is in the occipital lobes, and that of binocular fixation in the corpora quadrigemina, or their vicinity. Mr. Berry was kind enough to let me try my test on a case, which I think was one of binocular fixation without binocular vision—a patient of his with congenital paralysis of the left external rectus. The left eye could not be moved beyond the middle line; loss of abduction, in other words, was complete. No diplopia could by any means be elicited, and yet on looking to the right both eyes seemed to move in perfect unison. Corneal images showed that on looking to the right each eye was accurately fixed for the mirror, until suddenly the middle line was reached, when the squint appeared. After operating for strabismus, and setting a squinting eye apparently perfectly straight, we are often at a loss to be sure whether both eyes are able to work together. We have some interest in finding this out, because if they do we know it will be a great preservative from any return of the strabismus, and we can give a better prognosis accordingly. By subjective tests it is often impossible to settle the question, the patients being so frequently either too young or too unintelligent to give us any assistance. An objective test, even though difficult, is, therefore, a great help, and I may repeat the description which I have given elsewhere:

“After operation, for some weeks at least, the eye operated on tends to remain more stationary than its fellow, so that by turning the head slowly to the right or left, we make, if binocular vision is absent, the corneal image on the squinting (and operated) eye slowly and steadily move across part of the cornea. If binocular vision be present, it *may* be strong enough to overcome the sluggishness of the squinting eye, in which case its image remains in the “fixation position” throughout. But even if the desire for single vision is not strong enough to effect this, there is always, if it be present at all, a part of the field of fixation over which the “fixation position” is maintained, and at the edge of this region the corneal image *suddenly* moves to another point. It is the continued maintenance of the fixation position during lateral move-

ments of the head, or else the sudden abandonment of the fixation position, instead of only gradually moving away from it, on which I count in making the test."

It is right to say that the use of Mr. Priestley Smith's excellent "tape method" of measuring squint at a metre was what first led me to make a study of corneal images at closer quarters and binocularly—as my first paper on the subject¹ elicited he had been simultaneously doing.²

A paper by Gullstrand (Sweden) must, by its review³ later on, be a good one, but I have not yet had access to it. He prefers a laryngoscopic mirror, so as to illuminate both eyes at once, and I find it does so very prettily, though it has to be held at rather too great a distance, and in practice, of course, ophthalmic surgeons would always prefer to use the instrument in their hand—the ophthalmoscope. A dark room is not necessary, as the method is, if anything, rather easier in a light room. The chief difficulty with a beginner is to avoid being misled by the irregularities which prevail in the size and position of the pupil. Asymmetry of the pupil is immensely more common than asymmetry of the corneal images. Frequent practice, however, soon dispels the difficulty, and since a few seconds suffice to make the observation, practice is worth cultivating on nearly every patient who is seated for examination of the fundus.

GONORRHŒAL ARTHRITIS; WITH NOTES OF CASES.

BY THOMAS H. MANLEY, M.D.,
OF NEW YORK.

THE complications of gonorrhœa are sometimes very painful and serious. Its sequelæ are numerous, often undermine health, or give rise to very grave symptoms. The most lamentable and unfortunate feature about this venereal malady is that the contaminated may infect the innocent; and that its virulence may, with all its intensity, fall on the latter, imperilling life or inducing organic disease, while the former is but slightly disturbed by it. Another strange and inexplicable character belonging to it, is its diverse and protean manifestations. Probably there are more lives lost from it, directly and indirectly, than are recorded. The physician, from a sense of respect for the family, or other equally worthy motives, is loath to set forth in the mortuary-certificate the real cause, and, by an evasion, substitutes something else. For

¹ Edin. Med. Journal, January, 1892.

² Ophth. Review, February, 1892.

³ Ophth. Review, December, 1892.

similar motives, in the majority of cases, he is obliged to often conceal the real nature of the malady from members of the family or friends of the patient while in charge of a case which has complications or is followed by serious sequelæ.

My impression is that the profession, as a whole, is not yet fully alive to a full knowledge of all the serious disturbances to which this disease may give rise. I am assured that this certainly is the case in many instances in which the disease spends its virulence on the arthritic structures, where non-articular rheumatism is associated with or succeeds it. For the purpose of illustrating, to a certain extent, the rather common occurrences of an infectious arthritis as a sequence of gonorrhœa, and emphasizing the importance of its early recognition and active treatment by appropriate measures, this brochure is submitted.

One of the most unfortunate features in connection with cases of gonorrhœal arthritis is that the medical attendant is often obliged to conceal the truth when he has them in charge, at least as far the family are concerned, the near relatives or friends. To tell a woman who is suffering the harrowing agony of an acute arthritis that her husband is the author of all her misery, and that he gave her the disease, would, in many cases, lead to the sudden breaking-up of that household and perhaps bring great misery to an innocent family of little ones. One, indeed, must exercise the shrewdest discretion here, further, for the reason that authorities are not yet by any means unanimous in their views on the etiology of the malady, some going so far as to affirm that it may develop subsequent to any irritation of the urethra, in the chaste as well as the infected.

The malady has been designated by me "gonorrhœal arthritis," because, as far as my individual experience goes, it is always associated with, or a sequel of, gonorrhœa. The affix rheumatism has been discarded, inasmuch as it bears but little resemblance to this malady, either in respect to causation, pathological changes, clinical history, or therapeutical requirements.

ETIOLOGY.—In 1878 Neisser discovered and described the gonococcus. He was able to cultivate it, but failed in his inoculation-experiments. From it being so constantly found in suppurative arthritis, he assumed that it was the infecting germ of clap. But many modern and experienced bacteriologists fail to agree on this point, several maintaining that the morphological character of the germ found in gonorrhœa vary, and that the so-called gonococcus may be found at times in the healthy, non-polluted urethra; besides, they affirm that they are not always present in gonorrhœa. Prudden and Delafield¹ admit that the rôle of the gonococcus is yet an unsettled question, and that it will require

¹ Histology and Pathological Anatomy, p. 312.

further observations to definitely establish its position. Billroth, Paget, Greene, and others take a similar view.

Therefore, as the precise fundamental element on which the contagion of gonorrhœa depends remains yet in doubt, we are unable to explain, on a scientific basis, the relation of this malady with the joint affection so often witnessed during its course.

All are agreed that gonorrhœal arthritis is always dependent on a urethral irritation or inflammation; in other words, on gonorrhœa, or a morbid state of the urethra closely resembling it. But authorities are at variance on the vital question of the infectious quality of the urethral discharge, or its dependence on a toxic contagion. Can a gonorrhœal arthritis be excited by injecting into the joint the purulent secretion of an acute clap, or *vice versa*? Can a suppurative arthritis be developed by charging the healthy urethra with the fluid contents of a gonorrhœal arthritis?

Stangiale¹ made the following observations in a case of gonorrhœal arthritis: Cultures made from the exudation thrown from the joint, with all precautions as to asepticity of instruments, showed no sign of growth. The effusion was purely sero-fibrinous and not at all puriform. The ordinary agents, like the culture media, failed to show any bacterial elements either in it or the blood withdrawn from the neighborhood of the infected joint. Further inoculations with the exudation also gave negative results, both in animals and in the human subject. The latter fact was ascertained by introducing some of the exudation into the deep urethra, and allowing it to remain there several hours. The report states that no inconvenience whatever resulted. Stangiale therefore agrees with the majority of observers in asserting the absence of specific toxines from the effusion of gonorrhœal rheumatism.

Hogge² divides the bacteria of gonorrhœa into gonococcus and pseudo-gonococcus, alleging that it is only in certain states and in certain types of gonorrhœa that the specific germ can be isolated. Gourley³ scarcely mentions gonorrhœa as a cause of joint disease.

It cannot be said that a study of micro-organisms has thrown any light on the connection between an arthritis and a mon-arthritis.

Gonorrhœal rheumatism so-called for the first time by Swiedeur, who was the first to give it an exhaustive study, though Brodie, Astley Cooper, Bonnet, Foucart, Brandes, and Rollet are each worthy of mention as early investigators. But it is only lately that it has been allowed to hold sway in the nosological system, as there have been many who have attempted to explain it away on various hypothesis. Bumstead⁴ cites Astley Cooper as being among the first in England to recognize and describe this as an independent disease. Bumstead claimed that sexual

¹ Gazz. degli Osp., Feb. 11, 1893.

³ Diseases of the Genito-urinary Organs, 1892.

² Annals of the Genito-urinary Organs.

⁴ Venereal Diseases, p. 217.

influence is important, and that the malady exists, if at all, in females. Foucart never saw a case in a female. Brandes, of the Venereal Hospital of Copenhagen, had a similar experience. But, Rayer and Bonnet¹ both report cases in females.

Brodhurst² says that the disease usually described under the name of gonorrhœal rheumatism is plain from the course of symptoms and effects of remedies; that it differs from ordinary rheumatism in many essential circumstances, though it seems no doubt, that while it occurs in most circumstances as a consequence of gonorrhœa, it may take place independent of gonorrhœal infection.

Mansell Moullin³ says, that "urethral arthritis" is closely akin to puerperal arthritis, though dependent on some lesion of the genito-urinary mucous membrane. It is most common after gonorrhœa, though the proportion of cases in which it occurs is exceedingly small. In some cases it appears to be pyæmic, due to septic absorption from ulceration of the urethra, ending in acute ulceration and destruction of the joint; but that in the majority of cases there is little tendency to the formation of pus. This author advances the idea that it may possibly be due to reflex irritation of the nervous system.

The author of "Gonorrhœa and its Complications," in the *System of Surgery by American Authors*, says, on causation: "This disease has been ascribed to various causes, as metastasis, reflex agency, identity of syphilis and gonorrhœa, pre existing rheumatic diathesis, and finally a form of septicæmic infection, the last being the one usually accepted as correct."

Billroth⁴ places this among the metastatic inflammations. He says that it usually occurs during an attack of gonorrhœa, but that it may follow on the passage of a sound or bougie. Sexual intercourse with a menstruating female has been known to produce it.

In concluding the etiology of the subject it may be well to add that until very recently there have been many high authorities who denied that this affection was anything other than a rheumatism, aggravated or intensified and having peculiar characteristics imparted to it by a venereal infection. They argued that like rheumatism it had an affinity for the fibro-serous tissues, as the cardiac and brain membranes, and was most prone to occur in consequence of cold, dampness and exposure.

But recent and extended investigations have proven that it has little if any affinity to inflammatory rheumatism, either in its clinical features, pathology or indications for treatment. It has been clearly and definitely established that it has a definite connection with urethral irritations or inflammation, specific and non-specific.

Accordingly, then, from all that can be gathered from reliable sources, and from those most competent to give an opinion, though gonorrhœal

¹ *Traité des Maladies des Femmes*, p. 217.

² Reynolds' *System of Medicine*, p. 203.

³ *Chirurgie*, p. 612.

⁴ *Surgical Pathology*.

arthritis is generally present only in association with, or consecutive with a specific clap, yet it may and does occur simply from urethral irritation of a non-venereal character; therefore, it cannot be regarded as a condition always attributable to a specific microbe, and may attack the joints of the pure and untainted as well as the polluted sinner. In all of my own cases except one it supervened on genuine clap of the venereal order, though in other cases with which I am familiar infection was denied. Certainly, in some of them no gonococci could be found on repeated examinations, though in all there was a urethritis.

CLINICAL HISTORY.—The general outlines of gonorrhoeal arthritis, while bearing a close analogy to acute rheumatism, are yet quite unlike it in many important particulars. In the former it follows a chill; but its onset is more gradual. It, unlike rheumatism, is not a flitting disease, skipping from one joint to the another and one side of the body to the other. There are not those remissions of pain and fever, those short acute exacerbations. On the contrary, the temperature in gonorrhoeal arthritis seldom rises but a degree or two above the normal unless suppurative changes set in. The pain is steady, increasing in intensity until its climax is reached, when its moderation is as gradual and steady as was its advance. The pain is always most intense at night. The patient with this disease, unless it be of a very grave type, is up and about most of the time, seldom taking to bed except at night. Gonorrhoeal arthritis runs a tedious course. The orthodox treatment for rheumatism among many skeptics was "six weeks." Six months would be about the right period for a severe attack of gonorrhoeal arthritis.

Of course the disease may not extend over that length, but the patient will have little use of the joint for that time, and will do little but hobble about on a crutch or stick, in a severe case, which involves the lower extremity, till at least the six months are past.

This type of arthritis seldom involves more than one joint at a time. It has been said that the knee-joint is the usual seat of this affection and that it may be practically regarded as peculiar to the male sex. Bonnet wrote that its usual site was in those articulations never visited by rheumatism, as the sterno-clavicular and the rhachidian joints.¹ These observations certainly do not coincide with my experience, for I have seen nearly as many cases in women as in men, and many of the worst cases which have come under my care were in the upper extremity.

Perhaps this discord in observation may be accounted for on the ground that the most extensive observers have seen but few typical cases, and that they imprudently generalized on too small a number of cases.

But it appears, however, to be the general consensus of opinion that

¹ Bonnet : *Maladies des Ven.*, p. 217.

it is quite common for more than one joint to be affected, as we see from Foucart and Brandes' tables:

In 81 cases the disease was in the—

Articulation of the knee,	. . . . .	64
“ “ ankle,	. . . . .	30
“ “ hip	. . . . .	15
“ “ fingers and toes	. . . . .	15
“ “ shoulder,	. . . . .	10
“ “ wrist,	. . . . .	10
“ “ elbow,	. . . . .	8
“ “ sternum and clavicle	. . . . .	3
“ “ tarsal bones	. . . . .	2
“ “ sacrum and ilium	. . . . .	1
“ “ lower jaw.	. . . . .	1
“ “ tibia and fibula	. . . . .	2

Gonorrhœal inflammation falls with great energy on the thecal envelopes and bursa.

Fourner collected 120 cases—38 his own. The whole number of joints affected was 212. The knee 83 times (over two-thirds); the ankle 32 times (about one-quarter); fingers and toes 25 times (about one-fifth).

Gonorrhœal arthritis is always a severe disease; but I cannot find in its literature that it has a mortality. Neither can I discover chronicled any cases in which amputation has been rendered imperative to save life, as in one of my own cases.

It must be assumed that in those grave cases in which the endocardium participated in the pathological changes many lives must have been lost. Of course, we can understand that the mortuary records outside of a hospital are of no value in throwing any light on this side of the question; but certain it is that any malady which entails so much protracted suffering and waste of bodily strength cannot be regarded as free from danger, probably through visceral complications or blood infection.

MORBID ANATOMY AND PATHOLOGY.—I am unable to discover in the literature of the subject the records of any *post-mortem* examinations in cases of gonorrhœal arthritis. Hence, a detailed description of the morbid anatomy of the parts found after death in the different stages of this malady cannot be provided. We must, rather in this respect, depend on what we see through life in the action of the malady on the joint in the inflammatory, ulcerative or suppurative changes which lead occasionally to limitation of motion, ankylosis, and atrophy. In mild cases it cannot be said there are any tangible changes in the joint apparatus, the bone cartilage, ligament, synovial or tendon structures, while in all those severe grave cases permanent lesions of all these structures are general.

The pathological changes are most characteristic and uniform in all

types. Some pathologists divide this malady into three stages and describe three different types of the malady. Erichsen recognized three forms: first the *serous*; second the *purulent*; third the *fibrinous*.

This later classification in my experience serves no useful purpose, for in the ten cases which have come under my observation it was quite impossible in several to distinguish one type from the other; in fact, there is no doubt but we may meet with cases in which the exudate is of a mixed character. Besides, it is entirely reasonable to assume that in no inconsiderable number intense hyperæmia and congestion alone appear as a pathological state, when the disease, either by causes acting through the system, or by an active antiphlogistic therapy, is suddenly cut short and undergoes resolution. These may be designated the *walking cases* of gonorrhœal arthritis, which are as common as they are harmless.

For all practical purposes it is my conviction that it is enough to divide gonorrhœal arthritis into two classes. By this means its pathology can be more readily comprehended, a rational therapy instituted, and a safe prognosis given.

1. SUB-ACUTE, OR ABORTIVE.—This type is the most common. There are many who never go quite through all the stages of gonorrhœa, or are exposed to a wetting or a chill, who do not have a twinge of rheumatoid pains in one or more joints, most commonly in the lower extremities. The inflammation in this mild type involves the synovial sheaths and thecal envelopes of the tendons, then the bone or arthritic structures. Its course is short and acute, but it is not attended by any marked thermal disturbance, severe pyrexia being seldom present. In fact there is slight if any constitutional disturbance, and though locomotion is severely painful, the patient "wears it off" and continues at his occupation, unless it is very laborious. Where there is a perceptible exudate into the joints it gradually subsides, and entirely disappears leaving the functions of the limb unimpaired.

Very many of those cases are regarded as *rheumatism*. The patient may conceal the existence of clap, very often it is not suspected, and when joint disease is discovered it is generally expedient not to insist on its origin.

2. ACUTE SEVERE GONORRHOËAL ARTHRITIS.—In this type we will always have well marked pathological changes with more or less organic alteration in the joint elements. Here we will have any degree of pathological changes from a simple serous effusion to such a destructive joint suppuration as may demand the sacrifice of the limb. I have met with three cases of the latter which had been set down as "tubercular arthritis." Since the tubercular craze has recently swept over the profession there are some who can seldom if ever see any description of joint suppuration except tubercular. When the bacillus confirmation

was wanting then it would be said that the staining methods were faulty. But it is very probable there is no inconsiderable number in which the gonorrhœal infection has been engrafted on a tubercular diathesis.

The first stage of gonorrhœal arthritis is not as a rule painful. There is but little intumescence around the joint, and it is only over the tendons and at the insertions of the ligaments that we will elicit pain on pressure. But when the state of effusion has arrived and inflammation extends up through the tendon and muscle sheaths, the limb for a considerable distance above and below the joint is exquisitely tender, and all the tissues are more or less tumefied. As the progress of a gonorrhœal arthritis is slow when once well established, transitional changes are very tedious. In favorable cases resorption of the serous effusion takes place after a given time, and leaves little or no trace of the local action; but, we may have a recrudescence through some indiscretion of the patient, and the disease is rekindled with greater activity than ever. Now, the exudate may undergo fibrinous changes, so that when inflammatory changes have ceased, the articulating surfaces are solidly ankylosed by organized fibrin.

For some reason only explained on theoretical hypotheses, suppuration will set in and we will have symptoms of septic infection. The patient is hectic; is anæmic; emaciated and presents the appearance of one sinking from a wasting disease. In this class we may have one of three things occur. First, we may have resorption of the pus exudate, when this is not abundant and not too virulent; secondly, there may be a spontaneous opening and escape; or thirdly, there may be a maceration of the joint surfaces with ulceration and erosion of cartilage, ligament, membrane and bone. In this latter systemic infection is pronounced, and life is imperilled if the limb is not promptly amputated. Resection is quite out of the question.

In those severe cases the synovial membrane is always greatly thickened, its inner surface granular, pulpy and friable. The erosion of the articulating cartilage and bone gives their surfaces a worm-eaten appearance. The surface color of a gonorrhœal joint is always pale, and we will have a gloss of the integument seldom seen except in tubercular arthritis. The deposits of a gonorrhœal arthritis, unlike the rheumatic, are slow in undergoing resorption, and may often linger in an organized form in sufficient volume to thereafter leave a weakened limb with defective joint action.

The rôle of the gonococcus in this malady is yet unsettled. It would seem from the evidence that when the microbe is found it is a question whether its presence may not be a mere coincidence rather than an active factor in effecting pathological changes. If we were assured that gonorrhœal arthritis were attributable to a specific germ

infection, then the therapy would be clear, when we would neutralize the toxic agent with an appropriate antiseptic.

In the most virulent cases which have come under my own care the aspirated fluid was found by the bacteriologist to contain no gonococci; while, in other cases which run a mild course, it was said that the gonococcus and sometimes the diplococcus were seen in large numbers.

In the near past it was taught, almost as an immutable doctrine, that there was no tubercular lung without Koch's bacillus. But in a little while, as we wind around the circle we reach about the same line we started from; for it has been recently again and again demonstrated that a lung may be riddled with the millet-seed granules when the specific germ is nowhere to be found.

The pathological connection between a urethritis and the type of arthritis here considered is yet an unsolved problem from a scientific standpoint. But if we would assent to Hunter's views, which were at one time generally accepted, the connecting link is clear. He insisted on the unity and identity of *all* venereal diseases. The French school overthrew this theory. But, at the risk of the rack and professional condemnation, I will venture to predict that in the near future Hunter's views will be revived, for there is no scientific proof that there is not a very close affinity in the pathological elements of all venereal maladies. Hunter's dictum, it is true, had but an empirical support; but many of our most generally accepted doctrines rest on the same shaky foundations, and depend for confirmation almost wholly on the therapeutical induction. Once admitted that gonorrhœa and syphilis belong to the same family, the road is clear for direct and vigorous measures. But, candidly admitting that we know nothing about its essential elements, then our safest course will be to amuse our patient with homœopathic granules and leave the disease to Nature.

DIAGNOSIS.—The diagnosis of gonorrhœal arthritis is often attended with considerable difficulty; therefore, if one is not cautious, it may be confounded with rheumatism or tubercular disease. It is unlike rheumatism in many cardinal features. First, there is not the same intense, fluctuating pyrexia, exhaustive perspiration; the urine is free from the excessive deposits and saturation of the phosphates. Cardiac implication is unusual. The disease is generally mon-articular; its onset is gradual. It is said to be most frequent in the male, and to more often seat itself in the knee-joints. But, in my experience, these allegations have not been supported in their entirety.

The one symptom more common and valuable than all others is the persistence of pain and inflammation in *one* articulation. Another is the chronicity of the effusion into the joints. Unlike rheumatism, surface hyperæsthesia is not, as a rule, present, so that, in order to elicit pain, some slight pressure is needed. In gonorrhœal arthritis the joint

is immovably fixed and cannot be moved for a considerable period without great pain. The soft parts above and below the articulation are very sensitive. To the sense of touch the surface temperature is much less than in rheumatism. Rheumatic inflammation never runs into suppurative changes within the articulation. But suppurative inflammation is not uncommon in severe forms of gonorrhœal arthritis.

When one is reasonably assured that the arthritis is of a specific or urethral origin, then he should inquire as to whether the patient has suffered from gonorrhœa or has exposed himself. With a married woman it is well, unless there are special reasons, to limit one's inquiry to the husband. A patient dislikes extremely to have any one pronounce his joint distrait as traceable to a gonorrhœa. When the wife is the victim of his indiscretion, unless great pressure is brought to bear, the husband will deny his guilt.

When gonorrhœa is present, it definitely decides the character of the disorder. With men it is usually in the declining stages of the malady that the joint troubles begin, though there are certain individuals in whom the rheumatoid pains are coincident with the urethral discharge.

In women, in whom leucorrhœal discharge or vaginal catarrh is so often prevalent, the mucous secretion has no diagnostic value. Certainly, when the discharge is muco-purulent, and the vaginal mucous membrane is intensely red and deeply congested, little doubt can exist.

With the female it may be said that this type of metastatic inflammation is always attributable to an acquired infection. Little has been said on this point by syphilographers, probably because their *clientèle* is composed mostly of the male sex.

Another differential proof when rheumatism is suspected is the so-called "therapeutic test." In genuine gonorrhœal arthritis, colchicum and the alkalies make no impression, and the disease continues its unabated course.

The greatest difficulty will arise in recognizing the mixed cases, especially the strumous or so-called tubercular. But it is of vital importance in this class to distinguish their precise character; for tubercular arthritis in the adult is a malady generally incurable, while the gonorrhœal joint may be preserved. Adult tubercular arthritis seldom exists without pulmonary complications and other constitutional symptoms, which indubitably stamp its true character. Strumous disease pursues a very chronic course, and is attended by a low grade of inflammation. Gonorrhœal arthritis rarely involves the cancellous heads of the bones, while tuberculosis often destroys them. Bearing these general outlines of contrast in view, we will seldom confound one malady with the other, though more than ordinary powers of discernment in many instances will be required.

PROGNOSIS.—When gonorrhœal arthritis passes the first stage, effusion, hyperplasia, and tumefaction are well advanced before professional aid is called, the full functional power of the joint is never again entirely recovered, varying degrees of ankylosis remain, and trophic changes in the soft parts with wasting of the limb will follow. Stiffness and weakness will follow with a damaged joint. In rare cases the limb must be sacrificed in order to save life.

Nothing need be said of the common, mild, ambulant cases, as only the superficial parts suffer, and then but transiently. But with the genuine severe type we always have before us a serious malady to confront. As this disease is not common in the country, many practitioners in their entire lives may never see a case, and hence cannot appreciate the gravity of prognosis. Much will depend, without doubt, on the early and active character of treatment. Of all surgical maladies this is one from which the therapeutical nihilist should stand aside, for it should be treated promptly and energetically, or a crippled limb will remain. Should it not, the disease will run a very tedious and painful course. Let us, then, when we have recognized the nature of the malady, warn our patient what he may expect, so that he cannot in the end charge us with deceiving him as to its true character. Let us not forget that sometimes the most painful forms of ophthalmia, meningitis, and pericarditis develop in the course of this arthritis, and thereby aggravate the distress and add fresh dangers to life.

TREATMENT.—Shall the treatment of gonorrhœal arthritis be local or general, or both? Shall medical or surgical measures predominate?

Modern authors give us practically nothing under this head. In Osler's late work on the *Practice of Medicine* the writer inclines to the belief that surgery can effect more than medicine; that incision into the joint, with antiseptic flushing and drainage, is the most efficient measure. In Péan's recent extensive system of surgery¹ the author, in joint-inflammation "*des Arthrites*," in summing up their therapy includes blenorrhœic arthritis with the others, adding no special treatment. In Réclus' and Duplay's superb volumes on modern surgery² likewise no special line of treatment for this malady is directed. All our modern American authors give us little on this phase of arthritis. Like our French confrères, they seem content with pressure, immobilization, and prolonged rest.

Of recent distinguished American surgical writers and teachers, Dr. J. William White seems to be the only one who recommends energetic medication at the outset. He reports excellent results by the free use of quinine and the biniodide of mercury, the former in doses from five to ten grains three times a day, along with $\frac{1}{10}$ grain doses of the latter, until an impression is made on the disease.

¹ *Maladies Chirurgicales*, vol. vii.

² *De Chirurgie generale*, vol. vi.

Effective remedial measures, however, are efficient in practically all cases of gonorrhœal arthritis, if we can see the cases before organic changes have taken place in the joint. These should be constitutional and local. The former may be divided into antiphlogistic and sedative, the latter into detergent and orthopædic.

For internal administration mercury occupies the first place. First as a purgative and hepatic stimulant, and secondly in small, but oft-repeated doses, as an antiphlogistic. Mercury has long been known as an agent which acts with energy on acute or inflammatory processes, with specific power on *lues venerea*—on those venereal maladies which waste and destroy. But to realize its full potency it must be plied vigorously and early. Given late its action is rather baneful than otherwise. It may be administered by inunction, fumigation, hypodermatically, or *per orem*. In any event it should be plied with a free hand until there are signs of amelioration or its toxic action is becoming manifest, when it should be discontinued. At the same time, if the pain is yet very great we may prescribe such sedatives as may be demanded. If we suspect a malarial, rheumatic, or strumous complication, quinine, colchicum, and the alkalies, or cod-liver oil should be freely given. It goes without saying that the body should be at complete rest; in a comfortable posture, such as gives the greatest comfort.

Local treatment is essentially revulsive and orthopædic. I would place the local abstraction of blood as the most effective of all local measures in the early acute stages. Although there is said to be some objection to leeches, yet I have never seen any reason to reject them. In the full-blooded plethoric they act the best; but even with the anæmic, unless tuberculosis is present, they are equally efficient. The affected joint should be studded with from ten to twelve of them. They may be re-applied with advantage in many.

One of the first subjective effects following their action is the relief of pain; hyperæsthesia has disappeared, and the joint may now be manipulated without giving the former agonizing pain. The pain assuaged or abated at the seat of disease, sleep returns with increased appetite, and convalescence is established.

I could never see how any sort of an orthopædic apparatus served a useful purpose in the early stages of the disease. The joint certainly now needs no fixation adjustment, for the whole body is at rest and safe from any traumatic influence. But, when the intensity of the malady has passed over now, as the joint is temporarily crippled, a comfortably adjusted bandage serves a most valuable purpose.

Protracted immobilization in plaster-of-Paris is of little use unless the joint is hopelessly destroyed, when the support which it contributes fixes the articular surfaces until ankylosis is complete. The same may be said of extension or counter extension apparatus.

It is almost needless to add here that under varying circumstances in individual cases the treatment must be varied, and that he who is most fertile in therapeutic resources will have the best results. Hot or cold applications, emollient poultices, rubefacient plasters, and even the actual cautery, each and all have their place.

Surgical intervention is occasionally demanded in grave cases of this disease.

The injections of antiseptic solutions have been recently recommended in tubercular disease of the joints, and if useful with them should have some value in other infections. Iodoform, corrosive sublimate, carbolic acid, and chloride of zinc have been tried. They have never succeeded in my hands in accomplishing what was promised of them.

When we are assured by aspiration that suppurative changes have advanced and constitutional disturbances are well marked, then an incision into the joint, with free irrigation, should be tried. But, when pathological processes extend into the heads of the bones, lavage and drainage make no impress on the disease. When the articulating surfaces have been honeycombed by erosions and penetrating ulcers the joint must be sacrificed.

It now remains for the surgeon to decide between resection and amputation. As the system in these desperate cases is in a depraved state and the recuperative powers are very feeble, the only means which holds out any hope of saving life is an amputation.

NOTES ON CASES.

CASE I.—M. B., aged twenty-seven years; single; female. She said that six months previously she was suddenly taken with a severe pain in her left knee-joint.

She never had rheumatism; that her first medical attendant had treated this trouble, assuming it was that disease. She called in another practitioner after being laid up two months.

This was the 1st of March, 1888.

Now her limb was put in a fixture, with weights on the heel. Then plaster-of-Paris was applied; but all to no purpose. On the 2d of July she was sent to the hospital to have the joint resected, on the assumption that she had tubercular arthritis.

Condition on admission. She was of a pale, waxy color, with a very feeble circulation, markedly emaciated. Temperature $100\frac{1}{4}^{\circ}$; pulse 96. She gave no hereditary history of tuberculosis. She had no cough, but had night-sweats; now had no appetite and little sleep.

As the muscular tissue in the left leg was greatly wasted, the knee-joint seemed considerably enlarged.

The limb had many of the characters of "white swelling." Slight motion in the joint, but it was very sensitive. The pain was constant and excruciating.

She was ready to submit to anything which would relieve the pain. She was ordered to bed and directed to place the limb in such a posture as gave her the greatest comfort. This was the flexed posture, the limb

resting on its side. A large fly-blister was applied, and mercury with potash ordered to be taken internally.

It was noticed after a few days that her exacerbations of pain were the greatest on each alternate day; then ten-grain doses, three times a day, were given.

After this she commenced to improve, and she left the hospital after the fifth week, when she could walk without crutch or cane. She came in as an out-patient for a time, when she returned to her work as a dress-maker, with a stiff joint.

The pathology of this case would have remained a mystery had she not, after much persuasion, admitted that she had gonorrhœa, and was under treatment for it when her knee-joint trouble began. When closely questioned on the point, she said she remembered that the knee-joint trouble commenced when the discharge stopped.

CASE II.—Patient, a male, single, blacksmith, aged twenty-six years, came into Harlem Hospital same summer as the preceding. He had suffered from knee trouble more than two months before entrance. Father and mother died of consumption; always had good health until the trouble came on. Entered hospital for resection of the right knee-joint.

Condition on entrance. Short, stout build; can get around on crutches only. Pulse, 90; temperature, $99\frac{1}{2}^{\circ}$. Has been a heavy drinker, and has had gonorrhœa four times. Had a gleet discharge when he was seized with the knee-pain. Has a fair appetite, but can sleep very little, owing to the pain in the affected joint.

The right leg was carried in a flexed position at an obtuse angle; some motion in the joint. The synovial pouch distended by a fluid accumulation. Not so much wasting of the limb.

There was no evidence of erosion of the limb, and hence he was advised to submit to further tentative treatment. But as he had suffered so much, and was assured that resection would at once rid him of his infirmity and quickly restore him to health, he was unwilling to have anything else done. But when he was informed that resection meant the complete destruction of the joint, and should it succeed he never could shoe any more horses, he changed his mind and decided to do what was recommended.

He was at once placed on mixed treatment. The joint was blistered twice. His improvement was gradual, but steady. He left the hospital on the fiftieth day after entrance, and though he yet limped slightly he soon returned to his work as a horse-shoer, and when last heard from had a useful limb.

This case was another in which tubercular arthritis had been diagnosed and the joint condemned. The chief conspicuous feature connected with it was the absence of severe constitutional disturbance.

CASE III.—Patient was a female, aged forty-eight years; domestic; was ill two weeks when I saw her.

History. Patient gave no antecedent nor personal history of rheumatism or tuberculosis. She said that she had good health until she was married, something more than two months before; said she had the

"whites," but that they had become very yellow, and caused a burning pain in urinating.

For two weeks her left knee was so painful and swollen that she was unable to walk on the limb affected; had become so painful now that she could neither stand nor walk.

Temperature, $101\frac{1}{4}^{\circ}$; pulse, 108.

Constitutional disturbances pronounced.

Her husband, who was fully thirty years her junior, and who was said to have married her for her money, denied having the clap.

The case had all the characters of gonorrhœal rheumatism, and so it was regarded and treated. She soon after passed from under the doctor's observation and was lost from sight.

In this case the diagnosis was decided on by exclusion. The doctor had culture-tests and microscopical examinations made of aspirated fluid, but neither the bacilli nor cocci could be found.

CASE IV.—Patient a young man, married only six months. Never had gonorrhœa. Came to me, using a crutch and stick.

History. His family were rheumatic. Never had joint disease before.

Three weeks before was suddenly seized with lancinating pain in the right knee-joint. Has had severe pain in joint since, and for two weeks could not leave the house.

Had no reason to suspect his wife's virtue, but admits having had intercourse with her before the catamenia had ceased.

Condition on admission. Temperature, 99° ; pulse, 87. Had lost flesh and is very anæmic. Has poor appetite and gets but little sleep, as the pain in the joint is much worse at night than in the day.

The joint is but slightly swollen. No effusion. Tenderness and pain rather more at the insertion of the tendons than elsewhere.

Was ordered iron and arsenic, with mercury in alterative doses.

A flying-blister was applied on joint.

His improvement was rapid, so that within six weeks he was able to return to his place as a telegraph operator. Some ankylosis remained in the joint.

There was nothing of special importance to note in this case except one circumstance. He said that when first taken ill the young physician who was called in aspirated the joint, and reported to him that he had found in it the gonococci; hence informed him that he must have contracted the malady from some infected source, and that ankylosis was almost sure to follow.

CASE V.—Patient a salesman, single, aged twenty-seven years. Has had gonorrhœa several times. When called to see him he had been ailing some days. Was at home eight days from the store. He now had marked and severe constitutional disturbances, though the joint was not very painful. There was a large effusion into the synovial-membrane of the right knee-joint.

At the time the joint inflammation commenced he was suffering from a gleet discharge of the urethra, which ceased when the joint trouble began.

About two drachms of the sero-synovial fluid was aspirated from the knee-joint.

This on straining and mounting showed the presence of gonococci.

For the first few days his case promised to run a moderate course, but about this time he had a relapse, with a return in an aggravated form of all his previous symptoms.

The joint was now freely leeched; opium had to be freely administered to relieve pain, and calomel in $\frac{1}{4}$ -grain doses was given until the gums were touched.

His case ran a very severe course, and on subsidence of inflammation the joint was more or less ankylosed. He seemed to keenly feel the stigma of being the victim of a venereal malady. When he was able to be about he called on a surgeon in this city, who informed him that gonorrhœa had nothing to do with his condition, and that it all came from "cold."

The case was one of that severe type which could be traced to venereal urethritis, and the gonococci were present.

CASE VI.—Patient married, 30 years old; bartender. No rheumatic or tubercular history. This young man had been under treatment two weeks when I saw him, his case being regarded as rheumatism.

On inquiry it was revealed that he had recently had clap, and was recovering from it when he was stricken with urethritis.

At the time I first saw him he was in great distress. Temperature, 102° ; pulse, 114, full and bounding. Great bodily weakness, no appetite, and no sleep, except under morphine.

Has acute urethritis in the left ankle-joint. The swelling is considerable, and surface sensation extremely hyperæsthetic. Surface scrubbed and joints punctured. About half a drachm of turbid serum was removed and put into a sterilized vial. A dozen leeches were immediately ordered, a colchicum purge recommended, after which mercurial inunction was detected, as his stomach was extremely intolerant.

A microscopical examination of the fluid removed from the joint showed that no gonococci were found.

Under the prompt antiphlogistic treatment ordered relief was almost immediate, though his convalescence was tedious, and it was nearly four months before the joint would suffer any weight on it, during which time he had to move on crutches. I saw him a year after he passed from under my care, when I noticed that he walked without a limp, though he informed me that the joint was yet weak.

This was a case in which bacteriological examination gave negative results, and again demonstrated the salutary effects of antiphlogistic treatment.

CASE VII.—Patient an Italian, sent into Harlem Hospital from Out-Patient Department. His knowledge of the English language was so deficient that little or no history could be gleaned from him.

He was sent in for treatment of an arthritis of the left elbow-joint. All the usual rheumatic remedies had been tried, but in vain. As he was very anæmic and rapidly wasting, he was supposed to be suffering from tubercular arthritis; such a condition as required an arthrotomy and drainage. On entrance the joint was aspirated and one drachm of a yellowish-white substance removed.

On physical examination nothing was found which bespoke either

tuberculous or rheumatic inflammation of the lungs or heart. On a sort of milking pressure on the urethra a gleet, gelatinous fluid oozed through the meatus.

Temperature, $101\frac{1}{6}^{\circ}$; pulse, 112.

He was now a very weak and sick man.

Was placed in bed; quinine, opium, and mercury given internally. The arm was placed in a movable sling, and a large fly-blister was applied to the joint.

The examination of the aspirated fluid revealed an abundance of gonococci.

His improvement, though very slow, was steady. He left the hospital three months after entrance, with some ankylosis at the elbow, a wasting of the entire arm, and some stiffening in the wrist and finger-joints.

This was one of those cases in which a diagnosis had to be based on objective symptoms alone in the beginning. The moderate ankylosis of the fingers was attributable to an extension of the plastic inflammation from the joints to the condyloid muscles which act on the digital articulation.

CASE VIII.—Patient a married woman, aged thirty-four years. She had recovered from the acute stages of the malady when I saw her. She had been sent to me by Dr. George V. Hann, of this city. She had been under the care of another physician for some months, and as an action had been commenced against the latter in the Supreme Court for malpractice she had been sent to me for an examination and a statement of her condition at this time.

At the time I found her in fair bodily health, as all inflammation had ceased, and there remained only moderate ankylosis and wasting of the limb.

It seems that some six months before she was suddenly taken with severe pain and swelling in her right elbow-joint. This went on to supuration. The medical attendant, finding that the joint affection was wanting in the true characters of rheumatism or tuberculosis, suspected gonorrhoeal infection. She had been confined but about two months when she was taken ill. The husband, it appears, at first denied that he had exposed himself, but later admitted that after her confinement he had a urethritis.

When the doctor's bill came in for treatment, an action was commenced against him, and the husband again strenuously denied that he ever acknowledged he ever had gonorrhoea.

CASE IX.—Patient a female, *demi-monde*, aged twenty-two years, single. Father died of pneumonia at forty-five. Mother yet alive and well. Never had rheumatism. Always enjoyed good health until present trouble. Says she went to a ball, danced and became very hot, one night last January. A few days later severe pain commenced in the left knee-joint. At first she was treated for rheumatism, for four weeks, when an abscess opened in the popliteal space. Another medical attendant was now called, who sent her to a hospital.

She was at first under the care of my colleague, Dr. Chas. B. White, at the Harlem Hospital, who turned her over to me on the expiration of his term of service.

At time of entrance and now, extremely anæmic, highly feverish and

very nervous. She was very greatly broken in health, and said that she had lost forty pounds in weight since her illness began.

Her skin was of a marble whiteness, her appetite was very poor, had constant thirst, incessant pain, and almost no sleep. Her general appearance would suggest septicæmia.

The entire left lower extremity had a most unhealthy aspect. The leg and foot are greatly enlarged by a bloating œdema; the skin covering which is cool and bloodless. This œdema extended into the thigh. The knee-joint was swollen and fixed in a flexed position. On motion a grating crepitus was felt within the joint, as the articular surfaces were rubbed together. Under ether, when a more complete examination was made, it was evident that the chief anatomical structures of the joint had been destroyed by ulcerative processes.

She confessed to having gonorrhœa at the time she contracted the synovitis. Physical examination revealed no evidence of tubercular disease of the lungs.

The only question now to decide was, as to whether a resection or amputation should be performed; for pre-incision, grattage, irrigation, and draining had been fruitlessly tried.

Amputation was decided on, as her general condition was such that it was clear she could not endure the shock of a resection, which would occupy so much time, and besides, there seemed no possible prospect of the bony surface fusing after operation.

On the day of amputation her condition was most deplorable. Her temperature was $103\frac{2}{3}$, and pulse 150, thready and hardly countable.

She was gradually inebriated with small doses of brandy, commencing in the morning; the limb was thoroughly prepared and everything gotten in readiness; and at three in the afternoon she was placed on the operating-table and given but a few whiffs of ether, not more than one-half ounce being inhaled, when the heavy amputating-knife was carried at one sweep through all the tissues, from the skin to the bone; the femoral artery being compressed by an assistant. Now, all the tissues were pressed backward over the bone in an upward direction and the saw sent through. The vessels secured, the flap, composed of the tissues *en masse*, was then closed and dressings applied. Patient rallied well, and has since made a good recovery. The removed knee-joint I have presented to the New York Pathological Society. Drs. H. P. Loomis and Reginald Sayre said that the pathological changes did not have the characters of tubercular disintegration.

Microscopical examinations have been repeatedly made of the lining of the joint, but neither the tubercular bacillus nor gonococcus has been found.

This case was one in which the disease pursued a most rapid and destructive course. It was one in which tuberculosis would have been suspected were it not for the clinical history. This was finally disproved by the bacteriological examination.

CASE X.—This patient was a female, aged thirty-one years, married. It was four weeks after confinement when I saw her. The patient, a wiry little woman with a good family history, had enjoyed excellent health until April last. She was within ten days of being confined of her fifth child.

Early that morning she noticed a painful swelling on the anterior surface of the left wrist. Within six hours the entire wrist was involved, producing a pain which she figuratively described as if the hand were being wrenched off. This pain increased in severity without intermission day or night until her child was born ten days later, after a natural and easy labor. For a few days after this incident the pain was not so unbearable, and assumed an aching character with the sensation of the presence of fluid in the joint.

A week after delivery, April 21st, when I saw her for the first time, the whole hand and wrist were swollen and œdematous. The tenderness to pressure was particularly marked on the radial side of the wrist-joint, and seemed to radiate thence to the rest of the wrist, the carpus, and carpo-metacarpal joint of the thumb. Any motion in the wrist-joint was attended with excruciating pain. Signs of inflammation were always absent from every other joint, and consequently I had to do with a monarticular inflammation. The febrile symptoms were pronounced. The nerve energy was well nigh exhausted by the now unmitigated pain. The child now a week old had just developed a purulent ophthalmia to a remarkable degree.

A gonorrhœal agency suggested itself, but the mother asserted positively that she had not had any vaginal discharge during her pregnancy; yet there might have been some delicacy which forbid any such admission, for with Dr. Maher's aid the truth was extracted from the husband that he had had something of the kind five months before the child was born.

The treatment applied to the case as gonorrhœal arthritis consisted of absolute rest to the joint with firm pressure, a sufficient quantity of morphia to relieve the pain and allow sleep at night, and tonic of HgCl_2 , Fe, et As. The relief was prompt and progressive to the extent that, at the end of one month the pain and swelling had been entirely relieved, leaving, of course, the usual stiffness of the fingers and wrist. At the end of the second month she was doing all her own household duties.

I might here remark that the temporary relief experienced after confinement seems to me to have had a threefold agency: 1. The throes of labor rendered the wrist pain insignificant in comparison, and consequently more endurable. 2. The loss of blood at the time may have acted as a revulsive measure. 3. The increase of fluid within the joint offered some resistance to the force of attrition between the opposing layers of the serous membrane.

This case, it will be noticed, was at its worst after the puerperium, as with Dr. Hann's case. They undoubtedly are the same joint affections which some authors regard as caused by auto-infection after labor, but which, no doubt, if all the facts were known, could in most cases be traced to the husband. The doctor informs me that some ankylosis of the wrist and fingers remains.

CONCLUSIONS.—These ten cases taken together present many salient features well to be borne in mind by those called on to treat these cases, and in many respects it will be noted that they presented several characteristics not in harmony with the views of the generality of writers.

First, with reference to the diagnosis. This is not difficult to decide when the differential characters of rheumatism or tuberculosis are remembered. In all my cases except one there was undisputed evidence of gonorrhœa, though the specific microbe could not be found in all.

Indeed, M. Ch. Aubry,¹ who has made an extensive study of the subject, affirms that gonorrhœal synovitis or arthritis is always caused by a specific urethral microbe, not the gonococcus, and that when only the latter is present clap always pursues an uncomplicated course. Lang, Judassohn, Heissler, Reblaub and others are cited by him as supporting a similar position.

In none of my cases did perfect functional restoration follow the disease. Hence, urethral arthritis must be regarded as one of those diseases in which complete resorption of inflammatory deposits rarely if ever occurs.

My observations lead me to ignore the general view that it is a masculine disease, as in my cases there was an equal proportion in each sex. Prof. Sonnenburg, of the Moabit Hospital in Berlin, in whose service I saw several of these cases, informed me that this was his experience, also.

The treatment must be energetic and antiphlogistic. Mercury, if given early, exercises a most salutary influence in the course of the malady. If rheumatism is suspected as a complicating factor, then colchicum with the alkalies are useful.

The local management of the affected part is important. In the early stage free abstraction of blood; later, blisters, lotions, the bandage etc. After the acute stages have passed, then moderate motion should be instituted if we would avoid or limit ankylosis.

MYOMECTOMY AS A SUBSTITUTE FOR HYSTERECTOMY.²

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THE objection to hysterectomy, *i. e.*, the removal of the uterus with the tumor, since it deprives the woman of her reproductive function, is self-evident, and raises the question whether, in a certain proportion of cases at least, we may not have recourse to a substitute for hysterectomy which shall adequately remove the disease and at the same time preserve in whole or in part the uterus and its appendages. We already have this in the abdominal operation for pedunculated myomata and in the

¹ Gazette hebdomadaire, March 4, 1893. Bactériologie clinique du Chancre et des Blennorrhagiques simples et compliqués.

² Read before the American Gynecological Society, May, 1894

vaginal operation for intra-uterine and submucous myomata not larger than the foetal head, and in the operation through the sacrum after the method practised by Kraske in hysterectomy for cancer. This incision of Kraske has been used, and may possibly have a limited application for the removal of myomata situated in the posterior walls of the uterus near the plane of the os internum.

The special object of this communication, however, is the presentation of an operation for the preservation, whenever practicable, of the reproductive organs in the surgical treatment of uterine myomata by laparotomy. Five years ago I reported to the Chicago Gynecological Society a case operated upon in St. Luke's Hospital, in which the abdomen was opened, the tumor was enucleated, and the cavity from which the tumor had been taken was stitched into the abdominal wound by means of catgut sutures. These sutures approximated the margins of the visceral peritoneum, covering the uterus to the margins of the parietal peritoneum around the abdominal wound—that is, the wound into the uterus was stitched to the abdominal wound after the principle of Volkmann in the treatment of abscess of the liver. The principle is the same as that popularized by Tait in the surgical treatment of pelvic abscesses. In the performance of the operation temporary hæmostasis is secured during the operation by the usual rubber ligature around the lower part of the uterus below the plane of the os internum; this ligature is usually applied before the enucleation. As soon as the tumor has been removed, the margins of the uterine wound are drawn firmly up into the abdominal wound by means of hæmostatic forceps in the hands of assistants. Then the temporary rubber ligature is loosened, but not sufficiently to cause excessive hemorrhage, and the numerous bleeding-points in the bed of the tumor are rapidly caught up by numerous hæmostatic forceps. Permanent hæmostasis is now secured by isolated catgut ligature of each bleeding-point. If parenchymatous bleeding is excessive, this is controlled by quilting the surfaces of the bed of the tumor. This quilting process is desirable also because it folds the surfaces of the cavity from which the tumor was enucleated upon themselves, and thereby greatly reduces the size of the cavity. It should therefore be done in all cases where the tumor cavity is large, even though not necessary, as a means of hæmostasis. In some cases hemorrhage will persist despite the isolated and quilting ligatures. Then it is necessary to tie the uterine arteries. I prefer the isolation and ligaturing of the arteries themselves to the ligaturing of the vessels with their surrounding structures *en masse*. In a recent case in which the tumor cavity extended deep down into the uterus, and in which the walls were quite thin, I ligatured on either side *en masse* by passing the ligature from a point inside of the tumor cavity out to a point in front of the broad ligament, through the broad ligament below the uterine artery, back again from

a point on the other side of the broad ligament into the tumor cavity. The advantage of this manner of ligature is that it confines the ligature for the most part to the tumor cavity and leaves the peritoneum clear.

Permanent hæmostasis having been secured, the temporary rubber ligature is removed and the wound opening into the tumor cavity is stitched into the lower part of the abdominal wound. The sutures should be passed not at right angles but parallel to the margins of the wound and should be locked upon one another—*i. e.*, they should be so placed that the line of union will be secured by a chain of sutures extending around the margin of the opening into the tumor cavity, each suture making a link of the chain. It is essential that the opposing surfaces be accurately and thoroughly brought together throughout in order to exclude sepsis and to secure adequate union.

Before closing the abdominal wound, the left hand is introduced back of and under the uterus so as to steady it while the tumor cavity is being tightly packed with a continuous strip, two or three inches wide, of borated gauze. This secures hæmostasis and drainage. I have had two cases of almost fatal poisoning from iodoform and bichloride of mercury gauze. Now the gauze sponges or sea-sponges which had been packed around the uterus, in order to protect the general abdominal cavity and to absorb blood, are removed; the omentum is drawn down to the uterus and the wound is closed. The gauze drain is removed at the end of a week. If removed earlier, before strong union has taken place between the visceral peritoneum at the margin of the uterine wound and parietal peritoneum at the margin of the abdominal wound, the sudden contraction of the tumor cavity may result in the breaking up of this union and may cause a communication between the abdominal cavity and the tumor cavity; this accident occurred after my second operation by this method and caused the death of the patient. The only other fatal result in an experience of five years, by this method, was from slow hemorrhage, which continued for about five years. In this case the uterine arteries should have been ligatured.

During the first three of the five years since the report of my first case, I used the method in only a limited number of cases, having been discouraged on account of the two deaths already mentioned, which occurred during this period. In the past two years I have operated about twenty-five times, with no mortality whatever. In a majority of these cases I have removed the appendages, and in some of them, as I now think, unnecessarily. The proportion of cases in which they have to be removed is decreasing with increased experience. The preservation of the appendages is a matter of the most urgent necessity, and furnishes a strong incentive to conservatism in the surgical treatment of uterine myomata, because upon their integrity rests the value of the uterus.

Unfortunately the cases are not few in which their removal is neces-

sary. Myomectomy should be supplemented by the removal of the appendages in the following three classes of cases :

1. Cases in which the appendages are the seat of such disease as would demand their removal under other conditions.

2. Cases in which the enucleation of the tumor or tumors has so injured the uterus as to render it incapable of performing its functions, especially if the injury be such as would cause cicatricial atresia at the uterine ends of the Fallopian tubes. This might be the occasion for the removal of the appendages on one side only. With increased experience this class ought to diminish.

3. Cases in which the uterus contains an additional myoma so inaccessible as to make enucleation extremely hazardous.

When the walls of the tumor cavity are thin, I have frequently divided them on either side at a point near the junction of the Fallopian tube with the uterus; ligatured the tubes and ovaries after the usual manner; drawn the stumps inside the tumor cavity and stitched them there; and then closed the lateral incisions with catgut sutures tied on the inside of the tumor cavity, so that no considerable part of any suture should be in the peritoneal cavity. This has the advantage of making the operation extra-peritoneal, but it is only practicable when the walls of the tumor cavity are thin and the mesentery of the appendages quite lax.

The anatomical result of this operation after recovery is nearly identical with the result of a successful abdominal fixation of the uterus. But the operation is open to the objection of a somewhat prolonged convalescence, and if the appendages are left another myoma may develop. On the other hand, it has the advantage of preserving in a large proportion of cases the reproductive organs—an advantage so great and so apparent as to require no comment. Moreover, hæmostasis and drainage are secured, and the dangers of abdominal infection are reduced to the minimum.

The question whether the uterus should be preserved or removed with the tumor when the appendages have to be taken away, is still *sub judice*. Unquestionably the prime factor in conservatism must be the preservation of the appendages, because when they are removed the uterus becomes physiologically useless. It should atrophy and become rudimentary, *i. e.*, it should undergo physiological removal. It may, however, fail in this, and remaining large become a pathological element, a result so often observed, after the removal of the appendages for pyosalpinx, that recently a strong movement has started, a movement which is now gathering force, for the removal of the uterus also in the surgical treatment of that disease. If we except those cases in which the myoma has been complicated with pyosalpinx, it is not probable that hysterectomy in the surgery of myoma can ever be as strongly indicated as in the surgery of pyosalpinx, because in the former disease the uterus is less liable to

give trouble from suppuration. To remove the myomatous uterus as a universal practice, at the present time and in the present state of our knowledge is, perhaps, too much like punishing a culprit for a crime which he may possibly at some future time commit.

Dr. Senn has recently applied the principle of the method of myomectomy just described to hysterectomy. His modification is useful in those cases of multiple myomata in which enucleation of the tumor and the preservation of the uterus are impracticable. He dissects off the peritoneal and sub-peritoneal structures covering the tumor and uterus, making what he calls a "peritoneal cuff." He carries the dissection well down to the cervix, so as to separate the uterus and tumor from their peritoneal and sub-peritoneal shell. When the peritoneal cuff has been reflected back over the cervix, the cervix is constricted by means of the rubber ligature, and the corpus uteri together with the tumor is removed. The peritoneal cuff is now stitched into the abdominal wound, according to the principle described for stitching the tumor cavity into the wound after enucleation. The stump, constricted by the rubber ligature, sloughs out in a few days.

It would be possible to apply the same principle to Cæsarean section. After the removal of the contents of the uterus, the margins of the uterine wound could be stitched into the abdominal wound, and the uterine cavity packed with gauze. The after-treatment would be the same as in myomectomy. This extra-peritoneal treatment of the uterine wound, with its thorough capillary drainage, may prove safer than the usual intra-peritoneal method of suture; moreover, in case of subsequent pregnancy, the uterus being attached to the abdominal wall, a direct incision into the uterus could, perhaps, be made without invading the abdominal cavity. This would make any future Cæsarean section relatively safe.

The surgical treatment of uterine myomata must not be confined to any one operation. Radical extirpation of the uterus and the appendages is often indicated. I submit whether the preservation of these organs is not often imperative.

TREATMENT OF INOPERABLE MALIGNANT TUMORS WITH THE TOXINES OF ERYSIPELAS AND THE BACILLUS PRODIGIOSUS.¹

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THIS is a subject which has occupied no small portion of my time and attention during the past three years. Many of you are doubtless familiar with my previous paper, "The Treatment of Malignant Tumors

¹ Read before the American Surgical Association, Washington, May 31, 1894.

by Repeated Inoculations of Erysipelas," read before the New York Academy of Medicine, December 11, 1892, and published in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, May, 1893.

In that paper I gave a detailed report of ten cases treated by repeated injections of living fluid cultures of the streptococcus erysipelatosus, together with a summary of all the cases that I had been able to collect of malignant tumors associated with erysipelas, accidental or by design.

I began my experiments upon sarcoma in May, 1891, having been deeply impressed with the antagonistic and curative action of accidental erysipelas upon a case of recurrent inoperable round-celled sarcoma under treatment at the New York Hospital, in 1884.

I was able to trace the subsequent history of the patient, and found him alive and well in 1891, seven years after the attack of erysipelas.

CASE I.—This case was a recurrent sarcoma of the neck and tonsil, occurring in a man thirty-seven years of age. He had been twice operated upon, once by Durante, of Rome, and the second time by Dr. Bull, of New York, in March, 1891.

The tumor of the neck involved the deep structure too extensively to permit more than partial removal, and the tumor of the tonsil, about the size of a hen's egg, was left undisturbed.

When I began the treatment, May 2, 1891, the tumor of the neck was growing rapidly, and the tonsil tumor had filled the pharynx to such an extent that only liquid food could be taken, and that frequently regurgitated through the nose. He was greatly emaciated, and I began by giving injections of bouillon cultures of erysipelas (one to two weeks old) directly into the tumor of the neck. The cultures were of little virulence, and the reactions following the injections slight; nevertheless improvement followed, and whenever the injections were discontinued the change for the worse was quickly apparent. The injections were kept up the greater part of the summer without ever having produced an attack of erysipelas. Early in October I obtained a very virulent culture, and inoculation was followed by a very severe attack of erysipelas, lasting nearly two weeks. The tumor of the neck broke down in part, and in part was absorbed, while the tonsil tumor diminished in size, but did not disappear entirely. The patient rapidly improved in general health, and without further treatment of any kind; is alive and well to-day, more than three years from the beginning of the treatment, and two and three-fourths years since the last inoculation.

Frequent examinations have been made during this time, and the tonsil tumor has not increased at all in size, showing its malignant character must have been changed.

There remains some induration about the old scars, but this has not increased. There is good reason to believe the patient *permanently cured*.

This method of treatment, viz.: injections of fluid cultures of living streptococci of erysipelas, was carried on in the ten cases that I reported (loc. cit.).

Six of these cases were sarcoma, and four carcinoma—all inoperable. In but four of these did I succeed in producing erysipelas, although

cultures of pronounced virulence were used, and the injections were continued for a considerable time.

However, it was these very cases where I failed to produce erysipelas that proved to be the most valuable, as they furnished a hint as to the best practical method of utilizing the antagonistic action of erysipelas.

While the cases in which actual erysipelas was produced showed a most marvellous and rapid decrease in the size of the tumors (in two cases entire disappearance in two weeks), the cases in which repeated injections of bouillon cultures failed to produce erysipelas were attended with all the general symptoms of an attack of erysipelas, *e. g.*, nausea, vomiting, headache, malaise, and high temperature, but always disappearing within twenty-four to forty-eight hours. The effect upon the tumors was unmistakable. In some cases there was necrobiosis and discharge, in others diminution by absorption without breaking down, and in almost every case there were signs of retrograde action. These changes were always much more marked in sarcoma than carcinoma.

The great difficulty in producing erysipelas, the danger necessarily attending an attack of erysipelas (I myself having had two fatal cases from inoculation), added to the fact that marked improvement followed repeated injections of bouillon cultures, convinced me that a certain portion, if not all, of the beneficial action, was due to the toxic products secreted by the streptococcus rather than to the germ itself.

My first experiments with the toxic products were made in 1892, with bouillon-cultures treated by heat (100° C.). The reaction following injections of this fluid was similar in character to that caused by living cultures, but somewhat less severe. The effect upon the tumors was also slightly less marked, the destructive effect of heat upon most bacterial products being well-known. I very soon began using filtered cultures, prepared without having been subjected to heat. The cultures (obtained from a fatal case of erysipelas) were grown for three weeks at a temperature of 37° C., and then passed through a Kitasato filter. The filtrate thus obtained was put in glass-stoppered bottles, a small quantity of thymol crystals having been added, and kept in a cool, dark place. The elaborate experiments of Roger¹ upon rabbits, in Blouchard's laboratory, in Paris, had proved that the bacillus prodigiosus has the power of intensifying the virulence of the erysipelas streptococcus. I therefore determined to try the effect of a combination of the toxins of the two germs upon sarcoma. The toxins of the bacillus prodigiosus were prepared in precisely the same manner as has already been described in the case of the erysipelas. The preparations were kept separate, and the doses of each ascertained by experiment. These toxins were most carefully prepared for me by Dr. Alexander Lambert, Fellow in Bacteriology at the College of Physicians and Surgeons of New York, to whom I am greatly indebted for valuable aid.

¹ Revue de Médecine, December, 1892.

The effect of the toxines of prodigiosus was not only to greatly intensify the reaction of the erysipelas, but careful experiment with the toxines, singly and combined, in a large number of cases, has confirmed me in the belief that the antagonistic and curative action of the erysipelas is likewise greatly enhanced by the prodigiosus. Six of my earlier cases of sarcoma treated by the toxines of erysipelas and prodigiosus have already been reported (*Reference Handbook of the Medical Sciences*, supplement volume, September, 1893), and they will be only briefly referred to in the present paper.

Since December, 1892, I have treated 35 cases of inoperable malignant tumors with the toxic products of erysipelas and bacillus prodigiosus. Of these 35 cases, 24 were sarcoma, 8 carcinoma, 3 either sarcoma or carcinoma. A careful analysis of these cases, with a brief history of the more important, will, I believe, best conduce to a proper estimation of the value and limitation of this method of treatment.

My earliest case treated with the filtered products of erysipelas and prodigiosus was a large inoperable sarcoma of the abdomen and pelvis, occurring in a boy sixteen years of age. Its transverse diameter was seven inches, and its vertical five. It extended nearly to the umbilicus above, and was deeply attached to the pelvis below. In consistence it was exceedingly hard, and examination by the hospital pathologist of a section removed showed it to be sarcoma. The patient was referred to me by Dr. L. Bolton Bangs as an inoperable case. When the treatment was begun the patient's general condition was bad, and he was confined to his bed most of the time.

Injections of the toxic products of erysipelas combined with small quantities of the products of the bacillus prodigiosus, were begun early in February, 1893, at the New York Cancer Hospital. They were given locally, directly into the tumor, and in slightly increasing doses. The reaction following the injections was severe, and corresponded exactly with that seen at the beginning of an attack of erysipelas. The chill usually occurred within the first half-hour after the injection, though sometimes delayed an hour. Some local redness accompanied the reaction, but usually both local and constitutional signs had disappeared at the end of twenty-four hours.

The toxines were obtained from a fatal case of erysipelas, and were exceptionally strong. The doses given varied between 0.5 c.c. and 1.5 c.c. of the erysipelas, and 0.2 c.c. and 0.3 c.c. of the prodigiosus. Careful measurements made from time to time showed the tumor to be steadily decreasing in size, and on June 1, 1893, it was then two inches in diameter.

The boy was discharged from the hospital June 1, 1893. On August 1st the tumor had almost disappeared, save some enlarged inguinal glands, and a small mass in the right iliac fossa. The boy's general health had entirely recovered, and he had gained ten pounds in a single month.

He has been kept under constant observation since leaving the hospital, and has been working the entire time, enjoying the best of health.

There still remains some enlarged inguinal glands, and a small indu-

ration in the iliac region, yet no increase in size has taken place, and the element of malignancy has apparently disappeared.

CASE II. *Large recurrent sarcoma of the back and groin; entire disappearance of the tumors; no recurrence in fourteen months after cessation of treatment.*—This case is of particular interest, inasmuch as the successful issue was only due to persistent treatment under very discouraging conditions.

The patient, a native of Germany, forty years of age, had a large sarcoma of back (7 x 4 inches), with metastatic tumor the size of a goose egg, in the right groin. The groin tumor was partially removed in January, 1892, but recurred in a few weeks, and grew rapidly. A portion of the primary tumor of the back was excised and examined by Dr. Farquhar Ferguson, Pathologist to the New York Hospital, and pronounced mixed-celled sarcoma—round, oval and spindle celled. In April, 1892, both tumors were rapidly increasing in size, and being inoperable I determined to try the injection of fluid cultures of erysipelas. After giving the injections about two weeks, a very severe attack of erysipelas developed, involving both the back and thigh. Within twenty-four hours a marked change took place in both tumors; softening and necrosis occurred, and within two weeks both tumors had apparently entirely disappeared. The patient quickly regained his general health, but in July of the same year recurrence took place in both localities. The injections were resumed in October, and in November the patient had a second severe attack of erysipelas. Again the tumors almost disappeared, but not completely, and as soon as the attack had subsided growth became rapid. Injections of fluid cultures when given daily checked the growth, but as soon as they were discontinued the tumor increased in size.

In December the patient had three separate attacks of erysipelas, each case mild in character, and lasting but a few days.

In January, 1893, I removed the tumor of the back. The wound was left open and partially covered with Thiersch's skin-grafts. Most of the grafts failed to take, and three weeks after operation sarcomatous granulation appeared at the site of operation. The tumor in the groin, which had recurred, was also increasing in size. Injections of toxic products of erysipelas and prodigiousus were made into the groin tumor only, and repeated every forty-eight hours. Local and constitutional reaction similar to that described in the preceding case occurred.

The flabby sarcomatous granulations in the back at once began to disappear, and the tumor of the groin, which was about the size of an English walnut, began to decrease in size. At the end of four weeks no trace of the sarcoma remained in either locality. The injections were discontinued in March, 1893, since which time no treatment of any kind has been given. The patient quickly regained his health and accustomed weight, and has been attending to his usual work.

At the present time, fourteen months since the cessation of treatment, and more than two years since the beginning, he is in perfect health, with no trace of sarcoma to be found.

CASE III. *Sarcoma of iliac fossa; partial disappearance.*—The patient, aged fifty-five years, was born in Ireland, and had nothing worthy of note in his family or previous personal history. In January, 1893, he noticed a swelling in his right iliac region. It was accompanied by some pain, and grew steadily in size.

When I first saw him, in June, 1893, when he was admitted to the New York Cancer Hospital, there was a tumor about the size of two fists, deeply seated in the right iliac fossa. There was marked pulsation, which was regarded as transmitted, and the tumor was diagnosed as sarcoma. An exploratory incision was made, extra-peritoneal, and a portion removed and the diagnosis confirmed.

Injections of the erysipelas and prodigious toxines were at once begun, and continued, with occasional intervals, the greater part of the entire year. The tumor slowly decreased in size, and at the present time the greater part of it has been absorbed. The patient's health is perfect, and he has recently been discharged from the hospital.

CASE IV. *Inoperable sarcoma of the abdominal wall; exploratory operation; entire disappearance under treatment with erysipelas and prodigious toxines.*—Mrs. X., aged twenty-nine years, first noticed a small swelling in the abdominal wall, in May, 1893. This increased in size with considerable rapidity, was associated with a moderate amount of pain and some falling off in general condition.

In August, 1893, becoming alarmed at the size of the tumor, she consulted Dr. Maurice H. Richardson, of Boston. He performed an exploratory laparotomy, on August 31st, through both median and lateral incisions. The tumor was found to involve such a large portion of the abdominal wall, that it was regarded as inoperable, and the wounds were closed, after a small portion of the tumor had been removed for diagnosis. The microscopic examination was made by Dr. Whitney, of Harvard Medical School, and the specimen pronounced sarcoma. As soon as the wound had healed the patient was kindly referred to me by Dr. Richardson, and early in October I began injections of the toxines of erysipelas and prodigiousus. But little reaction followed moderate doses, and it required very large doses to raise the temperature to 101° and 102° F.; 103.6° was the highest point ever reached.

The injections were repeated daily, and within two weeks improvement was very evident. The patient's general condition suffered but little, and she was able to be up and about almost the entire time.

On December 22d I advised her to go to her home for a few weeks, in order to allow the inflammation, caused by the injection, time to subside, so that the exact amount of improvement could be determined. After three weeks she was examined by Dr. Richardson, who found the improvement so marked that he wrote me he saw no reason why she should not be permanently cured. She returned to New York on January 12th, and remained under treatment one month. The tumor had steadily decreased in size, and finally disappeared entirely.

On April 3, 1894, she was carefully examined by Dr. Richardson and myself, and we were unable to find any trace whatever of the tumor. All signs of inflammatory induration had likewise disappeared, and the abdominal wall was apparently normal. She had gained several pounds in flesh, and her general health had never been better. On May 23d, nearly two months later, her condition was the same.

CASE V.—F. K., aged fifteen years, female, was operated upon for fibro-sarcoma of the fourth and fifth metatarsal bones of the right foot, in 1890, at the New York Hospital. Two years later a Syme's amputation was performed by Dr. Bull for local recurrence. Six months later recurrence again occurred in the stump, and shortly after a tumor appeared in the popliteal region. In January, 1894, the girl was read-

mitted to the New York Hospital, with a tumor in the popliteal space the size of a child's head, and one in the stump the size of a hen's egg. The inguinal glands on the same side were also enlarged and indurated.

Operation was performed early in January, 1894, by Dr. Bull, and an attempt was made to remove as much as possible of the popliteal tumor. It was found very adherent to the vessels and nerve, and not being encapsulated, but infiltrating the neighboring muscles, it was impossible to make a complete removal. The tumor in the stump was purposely left untouched, in order to furnish a guide as to improvement from the erysipelas treatment, which it had been decided to try.

The injections were begun almost as soon as the wound had healed, and were given alternately in the stump and groin and occasionally in the calf of the leg. The improvement following the injections has been astonishing. The tumor of the stump has entirely disappeared, the glands of the groin can scarcely be felt, and there only remains a small induration in the calf of the leg. The patient has gained seventeen pounds in weight and has perfectly recovered her health. Whether or not the improvement will be temporary time alone can show, yet the history of the preceding cases gives us reason to hope for a permanent cure.

CASE VI. *Enormous round-celled sarcoma of the neck and thyroid; very marked improvement.*—M. S., female, aged thirty-eight years, a native of Russia, was admitted to the Mt. Sinai Hospital in December, 1893, in the service of Dr. Gerster. There was no history of heredity, and her personal history contained nothing worthy of note up to the date of the beginning of the present trouble. Her occupation, peddling, necessitated her carrying a heavy pack upon her right shoulder, thus causing more or less irritation to her neck.

Four months previous to her admission to the hospital she noticed a small lump on the right side of the neck just behind the sterno-mastoid muscle. A few weeks later enlargement of the thyroid was observed.

The neck tumor grew with such great rapidity that in four months it had reached the size of a cocoanut, while the thyroid tumor was the size of an orange. This was her condition when I was asked by Dr. Gerster to see the case with a view of trying the treatment of toxines of erysipelas, should it be deemed wise.

The larger tumor was firmly fixed to its base, which extended from the median line behind to the thyroid in front, and from the mastoid above to the clavicle and scapula below. It was markedly protuberant.

I removed a section of the tumor, which was examined by the hospital pathologist and pronounced "round-celled sarcoma." In spite of the large size of the tumor and the great rapidity of growth, I decided it was quite justifiable to try the effect of the toxines.

The first injections were of the erysipelas toxines alone, and doses of m_{xx} and xxx , gave a reaction of $101\frac{1}{2}^{\circ}$ with the usual constitutional symptoms, without, however, any chill.

The addition of m_{ij} of the toxines of the bacillus prodigiosus to the erysipelas caused a severe chill with a temperature of 104° F., with nausea, vomiting, and some diarrhoea. The condition had returned to normal on the following day.

These, with slightly varying doses, were given at intervals of two to three days for about four months, the reaction temperature ranging between 102° and $106\frac{1}{2}^{\circ}$.

Her susceptibility to the toxins was but little diminished by the long-continued injections, and, in spite of the frequent and severe reactions, her general condition kept up remarkably well.

As to the effect of the toxins upon the tumor, which is the real question of interest, I can state: the large tumor of the neck not only ceased to grow, but decreased considerably in size, as was shown by frequent and careful measurements. Furthermore, the tumor, which was firmly fixed at the beginning, became much more loosely attached, and the skin, instead of being tense and glistening, became almost flabby. The thyroid tumor also decreased one-half in size, and several smaller nodules in the neck, on the left side, almost disappeared.

The dyspnoea which at the beginning of the injections had become of serious moment, entirely disappeared. The decrease in the size of the tumor was due in part to softening and breaking down, and in part to absorption without softening.

The patient left the hospital a few weeks since with the promise to return for further treatment. This case proves more than almost any other the powerful antagonistic action of these bacterial products upon the most malignant type of sarcoma.

Here we have a tumor the size of a cocoanut, of such rapid growth that it had attained this size in four months, proven to be a round-celled sarcoma by the microscopical examination of an expert pathologist, not only held in check for four months, but markedly reduced in size by the injection of the soluble products of erysipelas and bacillus prodigiosus, without any other treatment internally or externally.

CASE VII. *Very large pulsating round-celled sarcoma of ilium.*—G. H., aged forty-nine, a native of Germany, was referred to me in September, 1893. He had a tumor occupying the whole of the left buttock and bulging into the iliac fossa in front. It undoubtedly started in the ilium, and was twenty-eight inches in circumference. It could be felt by the rectum. It was exceedingly vascular, and the pulsation quite as marked as in an aneurism.

About a year and a half previously, when about the size of a cocoanut, an attempt had been made to remove it by Braun, of Königsberg, but the hemorrhage was so profuse the operation could not be completed. The diagnosis then made was "round-celled sarcoma," and was confirmed by Kocher, of Berne.

I began the injection of the toxins in September, 1893, and continued them about seven weeks. During the first two weeks I used the same preparation of toxins that had proven so successful in the cases already reported, and during this time the tumor decreased two inches in semi-circumference, and the pulsation nearly ceased. At the end of two weeks I was obliged to use toxins prepared from other cultures of much less virulence, and the effect on the tumor was very slight. No further decrease in size occurred, and pulsation again slowly returned.

He returned to Germany in December, and at the present time is receiving injections of the toxins of erysipelas and prodigiosus prepared by Dr. A. Tavel, Professor of Bacteriology at the University of Berne. A recent communication tells me that the tumor is diminishing yet, with such an enormous growth, permanent results can hardly be expected.

Carcinoma. I have treated eight cases of carcinoma with the toxins. There has been marked improvement in two cases, slight improvement

in four cases, and no effect in the remaining two cases. In no case has the tumor entirely disappeared. A brief outline of the cases will be found in the accompanying tables.

They were all, with one exception, large inoperable tumors. The single exception was a primary carcinoma of breast, about the size of a goose-egg, occurring in a woman sixty years of age. A coexisting heart trouble made it unwise to give an anæsthetic, hence operation was not performed. Injections of the toxins were employed for about six weeks. Unfortunately a few applications of the caustic were applied at the same time, hence the effect of the toxins alone could not be absolutely determined. The tumor entirely disappeared, but recurred two months later. The toxins were again given, and without other treatment the tumor has steadily decreased in size. The case is still under treatment at the present time.

CASE VIII. *Epithelioma of bladder, involving abdominal wall and pelvic bones.*—The following is a very brief history of a most interesting case from many points of view other than the one relating to the present subject.

G. H., aged fifty-seven years, was operated on for papilloma of bladder, seven years ago, by suprapubic incision. Careful examination showed the tumor to be a papilloma.

Five years later his symptoms returning, a second operation was done (perineal section) and a mass, size of tangerine orange, similar in structure to first, was removed. Some epithelial tissue was found in the growths, but it was still called papilloma. Since that time he has been gradually failing in general health, losing large quantities of blood in the urine, and suffering excruciating pain. Last summer, about a year ago, he began to be lame in the region of the hip, and the lameness has slowly increased, accompanied by the appearance of a tumor in the right buttock, due to bony enlargement of the ilium. The whole right groin and region of Scarpa's triangle was also filled up with a hard, bone-like mass. During the same time a hard mass was discovered at site of old suprapubic incision. This increased until in January, 1894, it was four inches across and extended from umbilicus to the symphysis pubis. It was almost of bony hardness, and due to malignant infiltration of the abdominal walls.

I was called to see him on the supposition that the trouble was sarcoma, that diagnosis having been made by a well-known surgeon. A small piece was removed and examined. It proved to be epithelioma. The chances of deriving benefit from erysipelas toxins in such a case were very doubtful, yet it was thought best to try them for a short time.

I began January 7, 1894, at first using small doses every day, and later, larger doses every two or three days. Most careful measurements were taken, with the aid of the family physician. When I began, the hæmaturia was very severe, and he was losing large quantities of blood.

Three months have elapsed since I began, and his condition at present is as follows: The tumor of back and groin are slightly smaller, the tumor in scar has decreased in size and lost much of its vascularity. The hæmaturia, has never returned during the whole period, which, judging from his previous history, can hardly be attributed to anything but the injections.

In regard to general condition: His appetite has remained good. I have not been able to have him weighed, but he has nearly, if not quite, held his own. He does not get about with quite so much vigor as before, but the injections have been pushed, and he has naturally suffered some depression. The injections were left off for short intervals on two occasions, and the speedy increase in size and vascularity were ample evidence that the toxines had a controlling influence upon the tumor, though permanent cure can hardly be considered possible considering the extensive involvement.

CASE IX. *Epithelioma of superior maxilla*.—N. D., aged fifty years; family and previous personal history good. In August, 1891, he had three teeth pulled from upper jaw, one tooth was broken at time and jaw was somewhat injured. Nothing was noticed until February 1, 1893, when a small, flat swelling appeared in the region of the old injury. It soon broke and discharged pus. In April it had grown considerably, and soon after began to be very painful. In June it had reached a large size, and frequently discharged large quantities of pus and broken-down tissue. His general condition was much improved. When I saw him, September 11, 1893, his entire left face was involved, and the jaws nearly ankylosed, allowing him to eat only liquid food. Examination showed growth to be epithelioma. I attempted for more than four weeks to give him an attack of facial erysipelas, using the most virulent cultures at my command. He showed a great tolerance of the injections, and I could with difficulty get his temperature above 100° with large doses. Repeated injections had a decided effect in checking the growth, and considerable decrease in size followed.

After being obliged to give up producing erysipelas, I resorted to the toxic products. These were continued until the end of December. Once the injections were left off for one week, and during that time the tumor grew markedly. The severe pain and suppuration, added to the more or less depressing influence of repeated large doses of the erysipelas and prodigious, weakened his general condition, and I did not think it advisable to continue the treatment when permanent cure was impossible. His condition has steadily become worse since, and he can hardly live more than a few weeks.

CASE X. *Carcinoma of breast; recurrent*.—This case is of especial interest, since it is one of the few cases of recurrence seven years after operation.

The patient, aged seventy years, was operated on for carcinoma of the breast in 1884. The tumor had been observed but four weeks previous to removal, and was about the size of a hen's egg, occupying the upper and outer quadrant of the left breast. The breast itself was not excised, neither was the axilla explored. She remained perfectly well and free from recurrence for seven years, when she had a local return in scar. A second operation was performed with recurrence in five months.

When I saw her in the latter part of December, 1893, there was a hard tumor the size of two fists occupying the region of the left breast, and extending to the posterior axillary line. It was very firmly fixed to the chest wall, and the overlying skin was discolored, but there was no ulceration. There was also a hard mass, about the size of a hen's egg, above the right clavicle. Movements of the neck were greatly limited and painful. The right arm was markedly swollen and almost useless. The patient had long been a sufferer from rheumatism and

gastro-intestinal trouble, and her general condition was bad. Under such conditions the treatment with the toxins was begun solely with the view of affording temporary relief, permanent cure being out of the question.

My usual method of treatment was in this case somewhat modified, and very small doses were given every day instead of the larger doses every other day. The erysipelas toxins alone were used, and only in sufficient doses to raise the temperature from 99.5° to 100° F. The injections were made into the larger tumor. Before the toxins had been used a month very marked and unmistakable improvement had taken place. The tumor above the clavicle decreased more than one-half, and the larger tumor of the breast was considerably smaller and much more movable. The swelling of the arm became much less, by measurement, and the arm could again be used with comparative ease. Her appetite improved greatly. The treatment has been continued for nearly five months without any ill effects. At the present time the toxins have apparently less effect upon the tumor than at first.

The result in this case is sufficient to prove the powerful controlling influence of the toxins upon carcinoma even under most adverse conditions.

I have found osteo-sarcomata the least susceptible to the influence of the erysipelas toxins. Time will not permit a detailed account of more of the cases, but the chief points will be found in the accompanying tables. Summing up these we have twenty-five cases of sarcoma, eight cases of carcinoma, and three either of sarcoma or carcinoma, treated by the toxins of erysipelas and prodigiosus. If we include my first case treated by fluid living cultures of the erysipelas alone, we have five cases in which it is not unreasonable to hope for a permanent cure.

The first case, sarcoma of neck and tonsils, has gone nearly three years without treatment.

The second, sarcoma of back and groin, fourteen months since the injections were discontinued is perfectly well and free from any trace of recurrence.

The third, sarcoma of abdomen and pelvis, has been in perfect health one year since leaving the hospital, and the very small portion of the tumor that was not wholly absorbed has remained dormant.

The fourth, sarcoma of abdominal wall, which entirely disappeared under two and one-half months' treatment, remains perfectly well and free from recurrence three months since cessation of treatment.

The fifth, sarcoma of iliac fossa, is well one year since the beginning of the treatment, with the tumor one-third the original size, and the element of malignancy apparently destroyed.

A sixth, recurrent sarcoma of the leg and thigh, in which the tumor of the stump disappeared during the injections, is still under treatment, with no tendency to relapse.

In addition to these six cases, nine others showed marked improvement, eight slight temporary improvement, while in two there was no apparent effect. One of these two was an osteo-sarcoma of sternum, recurrent, of very rapid growth, and but four injections were given. The other was a recurrence following primary sarcoma of testes. The contents of the abdomen and pelvis were so completely involved, and the patient so weak and emaciated, that only very small doses could be given. Under such conditions improvement could hardly be expected.

If it were possible to formulate from such a limited number of cases any conclusions as to what types of sarcoma yield best to the toxins, I should say spindle-celled and mixed-celled, viz., round, oval, and spindle-celled tumors are the most susceptible to the action of the toxins, and periosteal and osteo-sarcomata (round-celled) are the least susceptible.

I have had but one case of melanotic sarcoma, multiple recurrent, which is still under treatment. The toxins evidently have a controlling effect, yet it is doubtful that it will prove curative.

All of the above cases have been kept under constant observation. When we consider that they were all hopeless cases from an operative standpoint or from any hitherto known method of treatment; that in every case the diagnosis was not only established by eminent surgeons, but also confirmed by the microscopic examination of competent pathologists, then only are we in a position to properly estimate the importance of this subject.

In regard to the cases of carcinoma we must, at present, speak with more reservation. In none of the eight cases which I have treated did the tumor entirely disappear, yet the very marked improvement that occurred in the most unpromising cases has strengthened me in the belief that the future treatment of inoperable carcinoma as well as sarcoma lies in this direction. The method of treatment is yet in its infancy, and there is every reason to believe that it can be greatly improved by careful experiment and research.

I believe the secret of the success in the cases reported has been largely due to the combined action of the toxins of the two germs. Although the mutual action of these germs in intensifying the virulence of each other had been demonstrated by Roger in animals, it had occurred to no one, as far as I have been able to learn, to make use of this biological principle in the treatment of malignant tumors.

During the past year I have been experimenting with these toxins prepared in a number of different ways. The method already described, viz: growing the germs separately in bouillon, three to four weeks, and then filtering through porcelain, was adopted in the earlier cases. Later, at the suggestion of Mr. B. H. Buxton, recent fellow in bacteriology at the Loomis Laboratory, I tried a preparation made by growing the

streptococci ten days in bouillon, then adding bacillus prodigiosus, which was allowed to remain two weeks longer. The bouillon was then filtered, and the filtrate thus prepared was exceedingly active, ten to fifteen minims being sufficient to give a temperature of 103° F. or 104° F. This preparation had, I think, a better effect on the tumor than the former.

As the filter of necessity removes whatever of value lies in the bodies of the germs, I prepared cultures by heating them to 58° C. for one hour. This temperature is sufficient to kill the germs, and probably causes little chemical change in the toxalbumens. Cultures thus prepared were considerably stronger, and the effect on the tumor was apparently slightly greater than similar cultures filtered.

I have recently been using cultures prepared by Dr. Lambert, as follows: Bacillus prodigiosus is grown in streptococcus broth, to which a very little cacao has been added, for four weeks or more, and then the broth is heated one hour to 58° C. The fluid is then used without filtration. This is by far the strongest preparation I have been able to obtain. I have had a temperature of 105° F. follow an injection of five minims, and 104° F. three minims. Whether its effect upon the tumors is proportionately greater than the filtered preparation, I am as yet not wholly convinced. A trial of several weeks in a number of cases has inclined me to believe it to be the best preparation thus far used.

A very important point remains to be considered, and that is the character of the culture used. Cultures obtained from any but a virulent case of erysipelas are of little value. All of my successful cases were treated with toxins from cultures from a fatal case of erysipelas. Without going into the disputed question of the identity of streptococcus of erysipelas and the streptococcus pyogenes, I will say that a large number of experiments with the living cultures of the streptococcus of erysipelas in the human subject have forced me to believe that the two germs are for all practical and clinical purposes distinct, although bacteriologically we may not be able to differentiate them.

The larger portion of this paper has been taken up with a record of facts. These facts are sufficiently out of the ordinary course to call for explanation, if such explanation is possible.

This is neither the time nor place to attempt to solve the problem of the etiology of malignant tumors, nor even to hastily review the arguments for and against the various theories. In my previous paper, a year ago, I outlined the reasons for believing malignant tumors to be of microbic origin. During the past year, although much has been written against this theory, more has been done to support it.

While to my mind no other theory offers a rational explanation of the clinical facts and various phenomena connected with malignant tumors, still less does any other theory explain the action of erysipelas upon such tumors.

Excepting for the moment the micro-parasitic origin of malignant tumors, an explanation of the action of erysipelas is not difficult. In the paper referred to I said: "If a small quantity of blood-serum of an animal rendered immune to tetanus is capable of destroying or rendering inert the virulent bacilli in a fresh case, it is quite as easy to understand that the toxic products of erysipelas might bring about such changes in the blood-serum as to destroy the parasite of cancer. The parasite having been destroyed, the irritation would consequently cease, and this would lessen the hyperæmia of the parts, upon which factor the life of the tumor cells of low vitality largely depends. This theory, if it may be called such, has occurred to me as offering the best explanation of all the facts observed. It explains the rapid degeneration with breaking down of tumor tissue, as well as the slower disappearance by absorption. It also explains those interesting cases, several in number, where an erysipelas remote from the tumor has caused disappearance in precisely the same way as a local attack. These cases prove the phagocytosis theory alone insufficient to explain the action of erysipelas. It is worthy of note that the action of erysipelas upon lupus and the secondary and tertiary lesions of syphilis is similar to that in malignant tumors, and this fact, joined to the fact that erysipelas has never been known to affect non-malignant tumors, is another point in favor of the parasitic origin of cancer."

In view of the results which I have shown it possible to obtain from the toxines of erysipelas and prodigiosus, which can be used with perfect safety and with scientific accuracy, I do not consider it advisable, except in extraordinary cases, to expose a patient to the risk attending an attack of erysipelas. I, myself, have had two cases for inoculation and I know of four others.

The results from an attack of erysipelas are shown by my tabulated cases to be little, if any, superior to those obtained from the toxines. The foregoing cases, I believe, warrant the following conclusions:

1. The curative action of erysipelas upon malignant tumors is an established fact.

2. This action is much more powerful in sarcoma than carcinoma.

3. This action is chiefly due to the toxines of the erysipelas streptococcus, which may be isolated and used with safety.

4. This action is greatly increased by the addition of the toxines of bacillus prodigiosus.

5. The toxines to be of value should come from virulent cultures and should be freshly prepared.

6. The results obtained from the use of toxines without danger are so nearly quite equal to those obtained from an attack of erysipelas, that inoculation should rarely be resorted to.

TABLE OF CASES OF SARCOMA TREATED BY TOXINES OF ERYSIPELAS AND B. PRODIGIOSUS.

No.	Sex and age.	Date.	Diagnosis.	Treatment.	Immediate result.	Final result.
1	M. 16	Jan. 1893	Sarcoma, spindle-celled.	Toxines of erysipelas and prodigiosus.	Almost total disappearance of tumor.	No relapse; perfectly well May, 1894.
2	M. 40	April, 1892 and Feb. 1893	Sarcoma, round, spindle, and oval-celled; recurrent	Erysipelas inoculation April, 1892; toxines Feb. 1893.	Total disappearance under erysipelas Apr. 1892; recurred in two months; recurrent tumor disappeared under treatment with toxines.	Well and free from recurrence fourteen months after cessation of treatment
3	M. 46	May, 1893	Sarcoma, round, oval, and spindle-celled; recurred twice; back and axilla.	Toxines; also given one severe attack of erysipelas by inoculations.	Improvement slight, but only temporary; axillary vein resected Dec. 1893.	Under treatment May, 1894, but little prospect of further improvement.
4	M. 55	Feb. 1893	Myxo-sarcoma of thigh; recurred twice.	Erysipelas and prodigiosus toxines two months.	Temporary check to growth; slight decrease in size.	Later increase in size.
5	F. 32	April, 1893	Sarcoma, thigh and pelvis; recurrent; round-celled.	Toxines of erysipelas and prodigiosus, also accidental erysipelas.	Very slight temporary improvement.	Rapid progress of disease later.
6	F. 20	Feb. 1893	Sarcoma, spindle-celled, hand; recurred five times.	Injectations at intervals till present time, May, 1894.	Marked improvement; growth checked; decrease in size marked.	Under treatment still.
7	M. 70	June, 1893	Sarcoma, back.	Toxines two to three weeks.	Slight improvement; temporary only.	Rapid increase later.
8	M. 45	June, 1893	Sarcoma iliac fossa size of two fists, six months' duration.	Injectations at intervals one year.	Tumor diminished two-thirds.	Patient in good health May, 1894.
9	M. 44	Sept. 1893	Sarcoma, very large, pulsating, round-celled, of ilium.	Toxines seven weeks.	Some decrease in size; marked decrease in pulsation first two weeks; no further improvement.	Treatment resumed April, 1894.
10	F. 29	Oct. 1893	Large sarcoma of abdominal wall; inoperable.	Toxines two and a half months.	Entire disappearance of tumor.	Patient perfectly well May 23, 1894.
11	F. 59	Oct. 1893	Sarcoma mastoid bone, involving dura mater; recurrent.	Toxines six weeks.	Marked decrease in size; patient's condition did not permit continuing treatment.	Rapid growth after injection left off; death Jan. 1894.
12	F. 55	Oct. 1893	Sarcoma sternum, very large; rapid growth with frequent and dangerous hemorrhages.	Toxines seven months.	Very marked decrease in size, and improvement in general condition.	After five months treatment effect of tonic less marked, and tumor slowly increasing.
13	M. 60	Jan. 1894	Sarcoma superior maxilla; recurrent.	Toxines two months.	Growth checked and some decrease in size.	To return for further treatment.
14	M. 22	Nov. 1893	Sarcoma of abdomen and pelvis; recurrent from testes, sarcoma.	Toxines 1 mo. (small doses); patient's general condition very desperate.	No apparent effect on condition.	
15	F. 17	Jan. 1894	Sarcoma of leg and popliteal region; recurrent.	Toxines three to four months.	Tumor nearly all disappeared.	General condition perfect; still under treatment.

No.	Sex and age.	Date.	Diagnosis.	Treatment.	Immediate result.	Final result.
16	M. 48	Jan. 1894	Large, recurrent, multiple, myxo-sarcoma of thigh (muscles).	Toxines four weeks.	Temporary decrease in size.	Later, rapid growth and fatal issue in April, 1894.
17	M. 40	Jan. 1894	Large, inoperable, lympho-sarcoma of neck; very rapid growth.	Toxines four weeks.	Temporary check when large doses were used.	Death two months later.
18	F. 30	April, 1894	Very large sarcoma of pelvis and thigh; recurrent.	Toxines seven weeks.	Considerable decrease in size; cessation of pain.	Still under treatment.
19	F. 30	April, 1894	Recurrent sarcoma of carotid involving bone of face.	Toxines seven weeks.	Almost entire disappearance of tumor.	Still under treatment.
20	F. 58	April, 1894	Recurrent sarcoma of superior maxilla.	Toxines two months.	Very marked improvement, tumor about half former size.	Still under treatment.
21	F. 38	Dec. 1893	Inoperable, round-celled sarcoma; neck and thyroid size cocoanut; four months' growth.	Toxines four and a half months.	Very marked reactions; growth entirely checked; considerable decrease in size by actual measurement.	Patient left hospital Apr. 1894.
22	F. 55	May 1894	Recurrent sarcoma inferior maxilla.	Toxines three weeks.	Softening of tumor; slight decrease in size.	Under treatment.
23	M. 37	Jan. 1894	Recurrent multiple, melanotic sarcoma (round celled).	Toxines one month; discontinued; resumed Apr. 7, 1894.	Growth checked; apparent disappearance of sarcoma; appearance of another, other nodules when injections were left off.	Under treatment.
24	M. 50	May, 1894	Sarcoma sternum; recurrent; very rapid growth.	Toxines only form injections given.	No apparent improvement.	

CASES OF CARCINOMA—INOPERABLE.

No.	Sex, age.	Date.	Diagnosis.	Treatment.	Immediate result.	Final result.
1	F. 39	Sept. 1893	Recurrent carcinoma of breast (very rapid growth).	Toxines two and a half months.	Slight temporary improvement.	Death January, 1894.
2	F. 37	Sept. 1893	Recurrent carcinoma of breast three times (very rapid growth).	Toxines three weeks	No apparent effect.	Death three months later.
3	F. 58	.....	Carcinoma of breast, size of goose-egg.	Toxines, with addition of a few applications of caustic; recurrent tumor, size of egg, treated with toxines alone.	Entire disappearance—recurred two months later; marked decrease in size.	Under treatment.
4	M. 55	Sept. 1893	Inoperable epithelioma of jaw; very rapid growth—three months.	Fluid living cultures failure to produce erysipelas; later, toxic products.	Growth held in check four months; some decrease in size.	General health fail'd; treatment left off Dec. 1893; rapidly worse since.
5	F. 45	Mar. 1894	Recurrent carcinoma of breast; multiple skin nodules.	Toxines two months.	Slight improvement.	Under treatment.
6	F. 70	Jan. 1894	Recurrent, inoperable carcinoma of breast.	Toxines five months; small daily doses.	Marked improvement; tumor decreased in size; swelling of arm much less.	Under treatment, but effect less than during first three months.
7	F. 43	Apr. 1894	Carcinoma of breast; inoperable.	Toxines five months.	Slight decrease in size, and supra-clavicular glands much smaller.	Tumor removed; numerous areas of caseous degeneration apparently caused by injections.
8	M. 57	Jan. 1894	Epithelioma of bladder, abdominal wall, and pelvis (very extensive).	Toxines four and a half months.	Growth checked; slight decrease in size.	Under treatment.
9	F. 34	May, 1894	Epithelioma of lower jaw.	Toxines three weeks.	Reduced in size two-thirds.	Under treatment.

SARCOMA OR CARCINOMA.

No.	Sex, age.	Date.	Diagnosis.	Treatment.	Immediate result.	Final result.
1	F. 35	Feb. 1894	Probable sarcoma of neck, orbit, and pharynx; rapid growth.	Toxines three weeks.	No apparent effect.	Treatment discontinued.
2	F. 38	Apr. 1894	Malignant tumor of hard palate.	Toxines four weeks.	Decrease in size of tumor.	Under treatment.
3	F. 37	Jan. 1894	Malignant tumor of retroperitoneal region; exploratory operation; inoperable.	Toxines six weeks in thigh and abdomen.	No apparent increase in growth.	Under observation.

CASES OF MALIGNANT TUMORS ASSOCIATED WITH TRUE ERYSIPELAS, AND NOT INCLUDED IN FORMER PAPER.

No.	Sex, age.	Date.	Diagnosis.	Treatment.	Immediate result.	Final result.
1	M. 65	February, 1893 (Coley)	Sarcoma of neck; recurrent; inoperable.	Erysipelas by inoculation.	Considerable decrease. Death fourth day.	
2	F. 55	August, 1893 (Coley)	Recurrent carcinoma of breast	Erysipelas by inoculation.	Developed acute pleurisy. Death sixth day.	
3	M. 48	September, 1893 (Coley)	Enormous sarcoma of femur and pelvis.	Erysipelas by inoculation.	Slight decrease in size; temporary.	Died two months later; autopsy showed abdomen filled with pus.
4	F. 38	January, 1894 (Coley)	Cancer, "en cuirasse," advanced stage.	Three severe attacks of accidental erysipelas during 3 months.	Slight breaking down of a few nodules and rapid healing of ulcerated areas.	No decided check upon progress of disease.
5	F. 32	April, 1893 (Coley)	Very large sarcoma of thigh and pelvis (round celled).	Accidental erysipelas, mild attack.	Slight temporary improvement.	Rapid growth thereafter.
6	M. 63	July, 1893 (Dandridge)	Carcinoma of neck 3 x 4 in. 3 in. elevation.	Accidental erysipelas, ten days' course.	Tumor decreased one-half in ten days.	Remained stationary awhile then began to grow.
7	F.	(Wyeth)	Inoperable sarcoma of abdominal wall.	Accidental phlegmonous erysipelas.	Entire disappearance	Well seven years after.
8	F.	April, 1894 (Westbrook)	Recurrent carcinoma of breast	Accidental erysipelas, mild attack, five days.	Free breaking down and discharge first three days.	No permanent effect on tumor

REVIEWS.

LES MALADIES DU SOLDAT. ETUDE ÉTIOLOGIQUE, ÉPIDÉMIOLOGIQUE, CLINIQUE ET PROPHYLACTIQUE. Par A. MARVAUD. Paris: Félix Alcan, éditeur, 1894.

THE DISEASES OF THE SOLDIER. By A. MARVAUD.

THIS work is worthy of more than a passing note, inasmuch as it is the first attempt at a systematic presentation of the diseases that prevail among soldiers in garrison in times of peace. Many important works have been published on the diseases that are prone to affect armies in active campaign, and many valuable articles have appeared on individual diseases as seen in the routine practice of military medicine in garrisons; but until now we have had no volume claiming to be a systematic treatise on the diseases of the soldier. Additional importance is given to this work by its semi-official character. Its author is entitled to speak *ex cathedra* as professor of military medicine in the Val de Grâce Medical School, and his statistics of disease and death are drawn from the official records of the Department of War. His matter is arranged under five heads: 1. The medical statistics of the French army and their comparison with the rates of other European services, and as far as possible with those of the civil population. 2. Infectious diseases. 3. General diseases, non-infectious. 4. Local diseases. 5. Diseases accidentally present, such as alcoholism and venereal diseases.

The attention of our army medical officers would probably be attracted by the statistics of this work rather than by the pathogeny, clinical characters, and prophylaxis which it presents, for the statistical data suggest comparisons at every turn, while the discussion of the other points is interesting only when illustrated by some army medical record. Yet these statistics are rarely susceptible of direct comparison with those of our army, on account of their failure to embody the lighter cases of disease. Sick men in the French military service are treated in quarters, in regimental hospitals, and in general hospitals; but the men treated in quarters are not taken up in the published record of sickness. The mean annual sick-rate of the French army is from 400 to 600, treated in hospitals, per thousand of effective; *our* annual rate is about 1300. Hence, according to the records, we have a morbidity more than double that of the French army. Last year our rate was 1270, but this included every man who was excused from even a part of his military duty on account of sickness. Incidentally, we learn that in 1889 the number of men excused from duty in the French army was 1375 per thousand of strength, so that if the lighter cases treated in quarters became with them as with us a matter of record, our sick-rate would bear favorable comparison with that of the French troops.

During the period 1862-90 the mortality rate of the French army on home service fell from 9 to 6 per thousand of strength present. The rate of the German army is 3.9. In making this comparison our author is not slow to point out that a death-rate may be kept low by discharging from service on account of disability those whose cases will probably have a fatal ending, and that the death-rate should never be considered *per se*, but always in connection with its complement—the rate of discharge for sickness. Thus regarded, the annual loss of the French is 27 per thousand men, deaths 6, discharges 21, and of the German army 32.9, deaths 3.9, discharges 29. Incidentally, we may remark that in the United States army last year we had a loss of 24.79, deaths 6.44, discharges 18.35. This last statistical item is not gathered from Professor Marvaud's work, but from the Annual Report of the Surgeon General of the United States Army. When we remember that the French have a home-service army of 500,000 men, and that 110 of their military posts are garrisoned each by more than 10,000 men, we can easily understand why the statistics of the United States army of 25,000 men make no figure in the Professor's volume.

In discussing etiology, clinical features, etc., too much space, we consider, has been given to the theories and opinions of previous writers, mostly French authors, on the subject under discussion. Too much space is given also to the development of views that belong to the realm of general medicine, and concerning which the reader, whether a young military surgeon or a civilian confrère, should have been credited with as full a knowledge as may be gathered from our author's pages. Nevertheless the work presents many points of interest, some of which are indicated in the following paragraphs.

Typhoid fever is represented as the most frequent and important of the infectious diseases that prevail in the French army. There is, however, no certainty as to the extent of its prevalence. Prior to 1888 typhoid fever and continued fever were reported separately—about 10 cases annually of the former per thousand of strength, and 20 of the latter. In that year, owing to a growing belief at headquarters in the identity of the morbid action in these cases, the term continued fever was expunged from the record; but the regimental medical officers do not appear to have accepted the doctrine implied in the change, for instead of an increase to 30 per thousand in the typhoid rate, this rate remained at from 10 to 13, while a large increase took place in the diseases reported as "other general diseases." As the deaths from typhoid fever can be identified, the rate of 3 per thousand of strength may be accepted as accurate; but with only 10 cases per thousand, the rate of fatality of the disease is manifestly excessive. Marvaud considers that if all the light cases formerly reported as continued fever and now as other general diseases were reported as typhoid, the disease would be about 16 per cent. fatal. Fatal cases are of more frequent occurrence in Africa than at the home stations, the annual death-rate in the latter being 1.8 per thousand; and as the statistics of the Minister of the Interior show a death-rate from this disease of only 0.72 among young men of the military age in civil life, the soldier is considered to run a correspondingly high risk. As a rule, the mortality is greater the larger the aggregation of men in garrison, military posts of over 10,000 men having larger rates than those of smaller effective; nor can these differences be ascribed to climate or altitude or medical topography. In fact our author con-

cludes that there are no soils favorable or unfavorable to the development of typhoid fever; but he considers that season has much to do with its prevalence, as its curve rises to a maximum in October in Algeria and Tunis as in France, and the curve of mortality follows the same course. In some localized epidemics the typhoid sick-rate has been as high as 100 per thousand, as at Nancy in 1875; at Satory, 180; at Brest, 250; and at Dinan, in 1889, 600 per thousand. When an epidemic is localized in a small garrison the mortality is sometimes high, whereas when a large garrison is affected only certain of the barracks become infected, and in comparing the number of attacks and deaths with the total military population the gravity appears less on account of the large number of individuals belonging to that population.

It is noted also that in some localities where typhoid fever is endemic there are barracks that are notorious for always being more affected than others. This is attributed to a morbid influence inherent in the barracks, or to pathogenic conditions in the quarter of the town in which it is situated, as at Paris, Lyons, and Nancy. At other times, notwithstanding the most careful research, nothing is discovered to account for the presence of the disease in a limited part of a garrison, as in 1890, in the third squadron of the Fifth Cuirassiers, while the other squadrons of the regiment, and other regiments quartered in the vicinity, all under the same hygienic conditions, were free from the disease. Importation by troops from an infected locality has, of course, been frequently observed.

Baudin considered paludal and typhoid fevers as antagonistic, and that there could, therefore, be few cases of the latter in Africa. In view of this doctrine all low fevers occurring in Algeria were for many years called malarial remittents. L. Laveran was the first to recognize the presence of typhoid fever among these cases; and now this fever is acknowledged to be the most common and deadly of the Algerian diseases.

In 1877 Colin attributed the occurrence of typhoid fever to a number of insanitary conditions, and particularly to non-specific miasms. He considered the part played by water in its propagation as a secondary one, consisting simply in the production of a determination of the morbid cause toward the intestinal canal. Shortly after this publication, however, the medical officers of the French army had their attention directed to the water-supply by some notable occurrences. An epidemic in the garrison of Arnane ceased when certain wells became dry, and eight days after a return to the use of the well-water, replenished meanwhile by rains, cases of fever began again to appear. Not long thereafter the discovery of the Eberth-Gaffky bacillus gave to water its present prominent place as a propagator of typhoid fever. The development of the fever from the bacillus coli communis by its transformation into a variety of that of Eberth is also suggested. Of seventy epidemics reported as having occurred during the period 1883-89, thirty-nine were regarded as due to the ingestion of contaminated water. It was therefore decided to introduce the Chamberland filter where the water was of doubtful quality. This has been followed by a marked diminution in the prevalence of the fever; 6881 cases were reported in 1887, 4412 in 1889, 3491 in 1890, and 3225 in 1891. Although the part taken by water in the propagation of typhoid fever has thus officially and beneficially been recognized, army experience is regarded as giving full warrant to assigning a certain part in causation to soil, air, and even to contagion. The influences

which augment the receptivity of the soldier as regards this fever are discussed under the headings: age, exposure of young countrymen to urban insanitary influences, overcrowding, and exhaustion.

The author diagnosticates his typho-malarial cases by a thermometric record taken every two hours, which he claims shows a double febrile action culminating in the morning for the paludal poison and in the evening for the typhoid factor. To sum up his views on this subject he cites Gancel in terms somewhat as follows: 1. Paludism may be associated with typhoid fever. In certain cases it precedes the dothien-enteritis; in others it appears simultaneously or becomes revealed in the course of the malady; at other times again it is declared only during the period of convalescence. 2. From this morbid association a special malady results, having its clinical and thermal characters varying with the proportion in which its two pathogenic factors occur in the case. 3. In the absence of regular or pernicious accessions the malarial influence is revealed by an alteration of the thermic type of the enteric fever and explains the hybrid and atypical forms of this affection. 4. The mixed nature of the typho-malarial fever is proved by its symptoms and pathological anatomy. This is the view of typho-malarial fever which we in the United States have taken since the analysis of the typho-malarial cases of the Civil War; and happily the ambiguous term itself has now nearly died out. A malarial remittent is with us a malarial remittent, although it may be adynamic in type, and a case of typhoid fever is reported as such, although it may be complicated with malarial manifestations.

Greater importance is attached by Professor Marvaud to the hygienic than to the medical treatment of typhoid fever. These febrile cases are treated usually in the largest and best-ventilated wards, and each patient has two beds side by side, a provision which prevents overcrowding and facilitates the employment of applications to the person. The strength is supported by beef-tea, milk, *café alcoolisé*, and generous wines; refreshing drinks, chiefly lemonade, are found to allay the distressing thirst and to promote the elimination of toxic principles (*leucomaines*) by diuresis; acid gargles are also employed and compresses wrung out of cold water and frequently changed are applied to the abdomen to promote intestinal contraction and prevent the retention of gaseous and fecal matters. Refrigerant and sedative lotions are used for the reduction of temperature and to allay disturbance of the nervous system. When the axillary temperature passes 39° C. (102.2° F.) sponging with carbolic vinegar as often as six times a day lowers the temperature from 0.5° to 1.5° C., allays nocturnal agitation and delirium, and promotes the cutaneous functions. These spongings are considered much preferable to baths. In the way of medication are given laxatives and purgatives in constipation, bismuth and opium in diarrhoea, when one or other of these conditions occasion danger by its persistence; for thoracic complications revulsives, as tincture of iodine and blisters, with expectorants as *tolu*; for nervous agitation and insomnia chloral and bromide of potassium. Quinine has been disused as unsatisfactory, for while influencing the fever but slightly, it aggravated the nervous symptoms, increasing headache, stupor, and *adynamia*, favoring collapse, compromising the case, and retarding convalescence. The internal administration of antiseptics was also discarded, as, notwithstanding all efforts in this direction, none has been discovered that is capable of arresting or mod-

erating in the living tissues the pathogenic power of the infectious element. Prophylaxis may be inferred from what has already been said of the etiology of the disease. The abandonment of an infected camp or barrack has become classic in military prophylaxy, as it arrests the progress of the local infection, preserves individuals who have not yet become invaded by the typhogenic germs, and permits of the necessary disinfection of the quarters.

Pulmonary consumption takes second place in importance. The death-rate from this disease is greater among old than among young soldiers; but our author claims that we would be wrong in attributing this to a harmful influence exercised on the constitution of the men by the fatigues and exigencies of military life. It is due to the fact that young consumptives are discharged from the army, but old soldiers who become affected dislike to be returned to civil life and are permitted to remain and die in the military hospitals. The mean number of cases originating in the army is four per thousand of strength, of which one is fatal in the service and three are discharged. The death-rate from phthisis is greater in the army by 150 per cent. than in the civil population of corresponding sex and age. The disease is prone to attack soldiers in their first year of service, comporting itself in this respect like all the other infectious and specific diseases. The proportion of consumptives in the army varies with the arm of the service—greatest in the infantry and least in the zouaves. The principal influence which makes itself felt in the partition of consumption among the various arms depends on the requirements for enlistment and the care exercised in the selection of the men. The experience of Professor Marvaud confirms the observations of many authors cited as to the existence of an antagonism between consumption and typhoid fever. Of the many autopsies he has made during typhoid epidemics in garrison he has never observed tubercles in the lungs or other organs, and has never seen a consumptive contract typhoid fever even when treated in a ward with typhoid cases. But he cannot similarly confirm Boudin's doctrine of antagonism to paludism.

Prophylaxis consists of: 1. The immediate discharge from service of all men affected with tuberculosis or likely to become so, such as those having weakly constitutions, vicious conformation of the chest, insufficient respiratory capacity, or hereditary tendencies. 2. The discharge as promptly as possible of all who become affected during service. 3. Preventive hygienic measures; location of barracks away from towns and on elevated and well-ventilated sites; thorough ventilation of squad-rooms, and day rooms for the use of the soldiers in inclement weather; antiseptics in spittoons and paraffined floors to prevent soiling with sputa; the disuse for a certain period of any squad room in which cases have been developed; isolation wards; disinfection; attention to diet; the avoidance of sudden transitions from heat to cold; and the use of such exercises in the open air as tend to expand the chest.

Vaccination has been in use in the French army since 1831, and re-vaccination since 1857. In 1866 an effort was made to substitute animal virus for the arm-to arm method, up to that time in use, but the experimental results were unsatisfactory, and it was not until 1889 that animal vaccine received official recognition. The army now raises its own supply of animal vaccine.

The chapter on cerebro-spinal meningitis is unsatisfactory save as to

its statistics. Etiology unknown, prophylaxis correspondingly uncertain, and treatment unhappily but little efficacious.

Diphtheria is the only specific febrile and infectious disease that has been increasing in prevalence of late years in the army. Its occurrence as a complication of other maladies is accounted for by the existence in the mouths of persons who have never had diphtheria and who have not been in contact with diphtheritic cases of a *bacillus*, Löffler's pseudodiphtheriticus, which would be harmless in a healthy organism, but which assumes pathogenic properties when the individual comes under the influence of pathological conditions. Little is said of differentiating these cases from other forms of sore-throat. Detersive applications are recommended, as of borax, chlorate of potash, nitrate of silver, lemon-juice, tincture of iodine, and perchloride of iron.

Jaundice is the next subject discussed—not the jaundice due to retention of bile, as from calculi, tumors, gastro-duodenitis, etc., nor that resulting from alterations in the hepatic parenchyma attributed to compression of the biliary ducts by the congested vessels, nor those cases due to alterations in the blood by the infectious agents of malarial and typhoid fevers, etc.; but a general disease of an infectious nature, the invariable lesion of which is acute yellow atrophy. No light is thrown on the obscurity of this disease.

As goitre occurs among soldiers only when stationed in localities where it is endemic, the disease is attributed to influences common to the soldier and the civil population. The infectious cause is assumed to be of a microbic nature and propagated in the water-supply.

The regulations of the French army in regard to the management of cases of glanders are cited in full. The proportion of deaths from bites of rabid animals is said to have fallen from 16 to 0.25 per cent. since 1886, when facilities were provided at the Val de Grâce Hospital for special treatment by Pasteur's method.

Paludism and diarrhoea and dysentery are discussed as infectious diseases prevalent in Algeria and Tunis. If our author gives expression to the views held generally by the French army medical officers, we must regard these officers as seriously at fault in respect to the propagation of malarial diseases. The opinions of Colin, last published formally in 1872, to the effect that the malarial germ enters the system by the pulmonary tract, and that it is doubtful whether the absorption of this germ can be effected by the digestive system when introduced by the drinking-water, are cited as current doctrine, although medical experience in those parts of this country and India where malarial diseases are most prevalent, has established a firm belief in their propagation by water-supplies, and practical sanitarians operating on this line have given a new reputation to localities formerly notorious for their insalubrity.

Two views are given of the causation of dysentery: that of Colin, which regards the disease as a simple inflammation of the large intestine produced by food or water of bad quality, by foul emanations, or by chilling of the surface; and that of Kelsch, which attributes it to a specific microbe. The latter view is approved by Professor Marvaud on account of the discovery of a special microbe in the stools by Chantemesse and Widal, and in consideration of instances of its importation into barracks in good sanitary condition, of its development in hospitals from the presence of affected persons, and of its propagation to the civil populations of cities and towns from contact with an affected army.

Our author's conclusions as to la grippe are those of Antony, published in 1890. The contagious character of the pandemic is proved by the coincidence of its appearance in a locality with the arrival of someone from an infected place, by the immunity of isolated persons, and by the special incidence of the disease on the men of the hospital corps as compared with those serving in other corps. The results of the study of the recent pandemic do not seem to have been before Professor Marvaud when his chapter on this disease was written.

As to cholera, we are surprised to find that the regulations in force in the French army are those of July 20, 1883, *i. e.*, of a date prior to the discovery of the cholera spirillum. The French authorities have not as yet given the bacillus of the distinguished German bacteriologist an official recognition.

Rheumatism is the only one of the other general maladies that is considered of special interest to the army medical officer, but we find in its discussion little of interest. Of 600 cases 20 have cardiac complications, necessitating discharge.

Local diseases are arranged under the headings of the various organic systems. Pneumonia is included among those of the respiratory system; but our author recognizes the specific and microbic character of the disease as developed by Jürgensen, Klebs, Eberth, Koch, Talamon, Fränkel, and Netter. Much of the heart disease among French troops is considered due to the rapidity and consequent want of care with which the examination of conscripts is made. Nostalgia is said to have disappeared from the army since the term of service was reduced to three years and special measures taken to provide recreation for the men in garrison. Skin diseases have the high rate of twenty-four per thousand of strength, and three or four of these are cases of scabies. Most of the cases of disease of the ear are said to have originated before enlistment. Cases are noted of otitis media from the introduction of cold water into the ear during bathing, as also cases of deafness from inspissated cerumen.

Venereal diseases have undergone a considerable diminution in their prevalence of late years. During 1862-69 the rate per thousand of strength was 106; 1872-79, 74; in 1880-88, 55; and in 1889-90, 45. These statistics, says our author, tend to place the army on the same line as the troops of Austro-Hungary and Prussia, which are in Europe those least affected with these diseases. He refers to the propagation of syphilis during the operation for tattooing from the use of a needle infected either by the saliva of the operator or by the blood of one who had been operated on previously. No special measure is in force for the suppression of venereal diseases; but the army is benefited by the sanitary police rules relating to the examination of prostitutes and the repression of clandestine prostitution applied in garrison towns for the prevention of the spread of the disease in the civil population. At one time a month's imprisonment was imposed on every venereal case after discharge from the hospital, but as this led the men to conceal their affection from their medical officers and place themselves for treatment in the hands of empirics, the order imposing the punishment was revoked.

AN OUTLINE OF THE EMBRYOLOGY OF THE EYE; WITH ILLUSTRATIONS FROM ORIGINAL PEN-DRAWINGS BY THE AUTHOR. By WARD A. HOLDEN, A.M., M.D., Assistant Surgeon, New York Ophthalmic and Aural Institute; Clinical Assistant, Vanderbilt Clinic. The Cartwright Prize Essay for 1893. Small 8vo., pp. 69. New York and London: G. P. Putnam's Sons.

THIS brochure is conveniently divided into two parts. The first consists of a brief and purely schematic sketch of the most important processes that occur during the ontogenetic history of the organ, and the second embraces an accurate description of the histological appearances of the various portions of the organ as seen during their successive phases of development. The former has been made quite easy of comprehension by the introduction of several explanatory diagrams, whilst the latter has been adequately elucidated by a series of careful drawings made from actual preparations in the author's possession.

As such a work as this can only be judged by careful perusal of every contained point, which must be compared and contrasted with the work and the views of others upon the same subjects, the task, although pleasant and profitable, becomes both difficult and at times, upon account of inability of sequential observation, uncertain.

Gauged from such a standpoint, we first reach his most excellent description of the evolution of the cornea. In this section he does not pretend to find the origin of the endothelial cells forming the endothelial layer of the membrane. He considers Descemet's membrane as a product of the endothelium, this belief being strengthened, as he says, by Wagenmann's studies with the human eye, where this author found that a similar elastic membrane is developed when the endothelial layer is displaced.

The facts that in mammals the cells of the corneal stroma lie directly against the superimposed epithelium, and that later a fibrous layer similar to that which is found in the deeper-lying corneal tissue, is the first here to appear, give the author sufficient support in believing that Bowman's membrane is simply an early product of the corneal cells themselves. He further thinks that the homogeneous material of the cornea "is in all probability simply an indifferent fluid filling a cavity."

To him, the capsular membrane of the lens sac is of cuticular formation of the epithelial cells. Curiously, and possibly wisely, he fails to make any specific mention of the so-called lens "stars," or lines of apposition of the terminals of the lenticular fibres.

Section 8, descriptive of the iris, ciliary body, and pupillary membrane, is one of the best in the book. Here, in speaking of coloboma iridis, he says that the fibrous cord running forward in the vitreous from the optic-nerve head to the posterior pole of the lens and then meridionally to the lenticular equator at which point it is inserted into the ciliary body at the head of the coloboma, as described by Hess, is merely a remnant of the fetal vessels left because of the failure of the development of the secondary vesicle at some anterior point, thus allowing the preservation of the posterior lens sheath vessels to extend over the anterior margin of the vesicle wall to reach the mesoblastic tissue outside: in short, as he says, "the persistent cord is not the cause of the coloboma of the iris, but the consequence."

The common view that at first the retinal vessels constitute merely a system of the vitreous vessels, he disproves by the fact that the two series are always separated from one another by the *limitans interna*. Beyond the mere division of the vitreous into apparent lamellæ along these vascular systems, he distinctly denies the existence of any demonstrable structural elements that might produce stratification.

He is very emphatic in his opinion that the large, pale, round cells with nuclei and processes in the optic nerve are frequently confounded with the branched and spindle shaped mesoblastic cells that form the sheath of the nerve, and that the former must be considered as the epiblastic cells of the optic nerve.

It seems a pity that whilst discussing the points of appearance of the orbicularis muscle in the middle structure of the palpebral mesoderm, he did not endeavor to trace its origin, which according to some is in the blastema of the muscular segments found at the upper part of the embryonic neck. It would also have been interesting and made the study more complete, if the origin and development of the extrinsic or so-called orbital muscles of the eyeball from the cephalic myotomes had been outlined. Especially could this have been logically done, as he properly tells us (a statement with which most practical embryologists are in accord) that he has made use of the findings in comparative anatomy: so here, as is well known, the lower vertebrates have their muscle-plates better developed, the results of Miss Platt's studies upon the cephalic myotomes of the *Acanthias vulgaris* might have been advantageously added.

Judged both from a practical and a scientific standpoint, the work—as it truly is, as it represents much conscientious labor—can be commended not only as a safe guide and a trustworthy teacher to the uninformed student, but offers itself as a delightful companion for careful perusal by the best informed and most profound embryologist. Bold at times in its denials, yet never without reason; offering sound judgment and best of common sense in the least certain of its guessings; and never too dogmatic in individual opinion nor forgetful of others' work in the same direction: too much praise cannot be given to the author for an honest endeavor to advance and popularize the more certain and the more accurate knowledge of the embryology of the eye.

The work is worthy of its entire purpose and should have many readers.

C. A. O.

A SYSTEM OF GENITO-URINARY DISEASES, SYPHILOLOGY, AND DERMATOLOGY. Edited by PRINCE A. MORROW, A.M., M.D. Volume II. New York: D. Appleton & Co., 1894.

THIS work is fully abreast of the times, embracing all the recent advances made in this department of medicine, and gives the experience of some of the best specialists.

Dr. James Nevins Hyde contributes a valuable treatise on the "History, Geographical Distribution, Evolution, and General Pathological Anatomy of Syphilis." It is very readable and interesting; full of useful information, told in a concise and entertaining manner.

In the article on the "Etiology of Syphilis," Dr. Fordyce has ably

set forth all that is known relating to the theory of the bacterial origin of the disease, as well as of the action of toxins upon the tissues of the body and the part played by the pyogenic microbes in causing well-known pathological changes so frequently found in connection with venereal disorders.

The whole is a valuable *résumé* of the subject. Whilst the author is unable to prove that syphilis is due to a specific micro-organism, he leaves in the mind of the reader but little doubt of the truth of this postulate, and shows that many manifestations of this affection can only be explained on this hypothesis. It is singular that whilst considering the bacteriological aspect of this disease nothing is said about the antagonism which seems to exist between the streptococcus of erysipelas and syphilis; this subject receives passing notice in another portion of the work.

One of the most important, practical, and valuable chapters to the general practitioner is that contributed by Dr. Prince A. Morrow on "Syphiloderma." Symptomology, varieties in type, unusual modes of evolution, morbid anatomy, and classification are taken up in turn and exhaustively treated. The wisdom of choosing Cazenave's classification of the syphilides, dividing the eruptions into the erythematous, papular, pustular, and tubercular forms, to which has been added a fifth division relating to anomalies in pigmentation and hemorrhagic effusions, becomes at once apparent on reading the article. The adoption of this arrangement renders the subject extremely simple and easy to understand. The general practitioner will be greatly aided by following this classification and will readily assign the eruption to the class to which it belongs.

The advantage of the arrangement of Dr. Morrow over those proposed by Hardy, Mauriac, Zeissl, Leloir, Willan, and others is too apparent to need more than a passing notice.

The article is well and instructively illustrated. Dr. Morrow is to be congratulated upon the successful production of Plates Nos. 3, 4, 6, and 12 by means of photography and lithography, "being the first time," as stated in the preface, "that this method has been applied to medical subjects."

This chapter is followed by valuable contributions by many of the best-known authors on subjects embracing special portions and organs of the body. It is needless to say that they are well written, are full of information, and represent the views of the leading syphilographers.

The very important section on the "Treatment of Syphilis" is written by Dr. J. William White. The article is full and complete.

The routine method of treatment advised is what is known as the "systematic course," which is the uninterrupted administration of mercury for the space of two years; first giving the remedy *per orem* for three months, then making use of mercurial inunctions for two weeks, returning to the internal use of the drug, and thus alternating until the period named has expired. After this the patient is to be placed upon the use of iodide of potassium. In very mild cases we have had perfect cures follow the interrupted method. The systematic course of treatment we have always reserved for more severe cases, believing that the larger the amount of the poison received into the system the more active should be our efforts to combat it.

A full review of the literature of the hypodermatic method of medication is given. Dr. White agrees with most English and American

authorities in condemning this form of treatment as a routine method of practice. The great objection urged against it is that relapses occur in a large percentage of patients thus treated, an adoption of some other method being necessary for the permanent cure of the disease. Dr. White has placed the literature of the subject fully and fairly before his readers. The conditions under which he recommends the employment of the hypodermatic medication may be summarized as follows:

"(a) Those cases in which other methods of treatment have been tried and failed. (b) Those cases in which, owing to idiosyncrasy or intercurrent disease of the skin, the digestive tract cannot be used for the introduction of mercury. (c) Those cases in which, owing to grave and advancing lesions, rapid mercurialization is absolutely necessary. (d) Those cases in which obstinate local lesions can be most directly reached by this plan. (e) Possibly those cases in which early differentiation between syphilis and malignant disease, or tubercular ulceration, is extremely important."

The hypodermatic method, in suitable cases, is one of the strongest weapons that the physician possesses wherewith to fight this disease; it finds its uses in those instances in which a rapid impression is needed, as, for example, when the eruption appears on the face; in married men; or when some vital structure is involved. The results are almost magical. It may likewise be employed as a substitute for inunctions when employing the systematic method of treatment, in relapsing or malignant syphilis, or in those obstinate cases which do not yield to other means of treatment.

We have administered many hundreds of hypodermatic injections of corrosive sublimate solution and of the gray oil; in no one instance has there been any complaint of pain. We have never seen an abscess follow their employment; it is true, however, that the gray oil will produce an induration which disappears in from two to four weeks; in two instances slight pytalism followed its use.

Dr. White earnestly calls the attention of the profession to the importance of looking after the hygienic condition of the mouth of the patient; insisting that the gums and teeth should be kept in the best possible condition; that the physician should examine the quantity and quality of the saliva; and be on the alert to observe if there exist a feeling as if the teeth were elongated, or if there be a sensation of tenderness produced when they are brought into sharp contact. These symptoms should warn the medical attendant that the limit for the use of mercury has been reached. Griping and diarrhoea are of secondary importance.

The use of opium combined with mercury is strongly condemned, on the ground that it masks the effect of that drug and permits its accumulation in the system, producing pytalism when least expected, beside laying the patient liable to contract the opium habit. The employment of ipecac or of tartar emetic is not approved.

Then follows an excellent article by Dr. Samuel Treat Armstrong on "Syphilis in Relation to Public Health," in which the author calls attention in a forcible manner to the failure of legislation to prevent the spread of the disease. He offers some practical and available suggestions, which if adopted would doubtless be of benefit to the general public.

The concluding articles are from the pens of Dr. Edward Martin and Dr. James P. Tuttle; the first is upon the subject of "Chancroid," and the second, that of Dr. Tuttle, on "Chancroid of the Anus and Rectum."

We take exception to the views of Dr. Martin, page 883, when referring to the operation of circumcision complicating chancroids. He says: "The foreskin should be split up along the dorsum. The objection to circumcision under these circumstances depends on the fact that the wound is frequently inoculated with the chancroidal virus and will become converted into a circular chancroid."

The objection to the method recommended by Dr. Martin, and indeed advised by many writers, is that it leaves two unsightly flaps, the shape of a dog's ear, on each side of the penis. If, immediately after the removal of the prepuce the operator will douche the part with 1 : 1000 corrosive sublimate solution, and touch the sores with pure carbolic acid, there is but little more danger of infection from circumcision than from splitting the foreskin.

Of seventeen operations of this description performed by us in the past five months, all recovered within a few days without any trouble, with the exception of two, which were slightly infected at the lower portion of the wound. We have on several occasions had to perform a secondary operation to remove unsightly flaps remaining after splitting the foreskin.

The illustrations and print of the work could not be improved. The book is full of valuable information, embodying the latest views of well-known teachers and writers; it will no doubt meet with what it richly deserves, a cordial reception from the profession.

O. H.

HANDBOOK OF PUBLIC HEALTH AND DEMOGRAPHY. By EDWARD F. WILLOUGHBY, M.D. Pp. 509. London and New York: Macmillan & Co., 1893.

THIS little book is a very welcome and valuable addition to the literature of hygiene, containing, as it does, a vast deal of useful information imparted without useless verbiage and in a most pleasing style. It is in most refreshing contrast with many of the more recent works which are but deserts of words with only occasional oases of ideas.

Chapter I., on the "Health of the Man," deals first with dietetics, treats in an interesting manner of the albuminates, fats, and carbohydrates; discusses the purposes served by food, the quantity of each of the food stuffs required, and the effects of an excess or undue preponderance of one or the other of the food stuffs. The composition of the principal articles of food is given, with much relevant information of an instructive character. Under "Ale, Beer, and Stout" the statement that Bavarian beer "is the mildest, containing but 2 per cent. of alcohol," is presumably a misprint, the lowest percentage of alcohol in Bavarian beer in the table following being 3.80.

The use and abuse of alcohol is discussed somewhat briefly, but in an absolutely fair and sensible manner, quite unlike that affected by those who write on this subject with sidelong glances at the various temperance unions, whose anticipated disapproval of the real truth has been responsible for much nonsensical literature. The remarks on cooking are rich in information of a practical value.

Adulteration of food is treated of in an interesting manner, and much information is given in a few pages. Complicated processes of analysis are omitted, the reader being referred to special works on food analysis, but methods, mostly qualitative and easily applied, are given for the detection of many of the adulterations of common occurrence.

The articles on clothing, bedding, baths and bathing, are particularly good and entertaining.

Chapter II. is on "Health of the House." Section I., on Air, Warmth, and Light is admirable, particularly that portion devoted to heating. Air analysis is not well given, but the author states that detailed descriptions of quantitative chemical analysis do not come within the scope of the book.

Section II., on "General Sanitary Arrangements," is up to the standard of general excellence.

Chapter III., on "Health of the City," is devoted to the consideration of water-supply, disposal of refuse and excreta, river pollution, and disposal of the dead. Though in some respects the sections on water-supply and river pollution are hardly up to date, they are far in advance of most of the writings on these subjects by English authors. The section on disposal of the dead is most sensible.

Chapter IV., on "Health of the People," discusses preventable diseases, vaccination, disinfection, and school and industrial hygiene. The deficiencies observed under disinfectants are more than compensated for by the admirable handling of vaccination. The sections on school and industrial hygiene are well worthy of careful perusal.

Chapter V., on "Demography," points out many fallacies in making tables of vital statistics. The remarks on the comparative mortality of various trades and professions are particularly sensible, and show the utter ridiculousness of many of the deductions drawn by our statisticians.

Chapter VI., on "Meteorology," is full of facts well illustrated by examples.

Chapter VII. is an enumeration of the many English acts and provisions relating to the public health.

An appendix contains tables of English and metrical weights and measures and analytical tables of the more important articles of food.

To speak in detail of the many good points of this book would involve so much quotation as to necessitate the reprinting of nearly the whole work. Those who are well informed in hygiene will find much pleasure and profit in reading this book, and those who are not ought to be obliged to study it.

C. H.

THE BLOT UPON THE BRAIN: STUDIES IN HISTORY AND PSYCHOLOGY.

By WILLIAM W. IRELAND, M.D. Edin., etc. Second edition. New York: G. P. Putnam's Sons. Edinburgh: Bell & Bradfute, 1893.

It has been said, wisely, that history is philosophy teaching by example. This book by Dr. Ireland may be said to be a contribution to history as a science teaching by experience. In it are contained some at least of the most glaring of the many illustrations which science may gather from the open page of history of the perversion of States, of creeds, and even of civilizations, by the blotted brains of imbeciles, of

fanatics, and of paranoiacs. The book, in this sense, is a notable contribution to the science of sociology; and presenting as it does its material in brief dramatic narratives, and in a crisp and attractive style, it has the advantage of elucidating with clearness and force some of the most abstruse psychical problems which have complicated the political and historical drama of all epochs and nations. The book for us has a profound depth of meaning, as illustrating both the degradation of States and the growth of stupendous religious delusions under the influence of the half-crazed or wholly debauched minds of prophets, priests, and kings. From our special standpoint, too, it is gratifying as the work of a physician, as illustrating the capacity of a scholar trained in the sciences of medicine and psychiatry to contribute, from out of the fulness of his special lore, to the benefit of some of the most recondite questions in the science of history. It is, indeed, a fine example of the doctor in politics.

Dr. Ireland's book, moreover, is in accord with the best modern spirit in its method of writing history. Not by act of council or parliament, nor even by the arbitration of great battles, is either the best or the worst of history made. This is now beginning to be recognized. It is the personal equation, or, according to the prophet Thomas Carlyle, the heroic element in man, that we must reckon with if we wish to rightly understand human history. But unfortunately there is an *unheroic* element in man, and this also has helped to make destiny on this earth, and of this element Carlyle and his school had little ken. This is the element which, with all its power for misrule, for tyranny, for absolutism, for superstition, for degrading states, for founding religions, from Tiberius to Mohammed, and Toghlaq and Ivan the Terrible—this is the element which we find described in Dr. Ireland's book. It merits no acclaim from even the most deluded hero-worshipper, but only the cold dissecting criticism which Dr. Ireland admirably brings to the task.

The hereditary neurosis which the author, with some others, claims was seen in the family of the Cæsars is described with rather too little of detail. The narrative evidently is taken largely from the pages of Tacitus and of Suetonius, with which studious readers are already familiar. The "insanity of power" is perhaps a new morbid entity which must be reserved for usurpers and for absolute monarchs. In the Cæsars it was conspicuously the fruit of the intoxication which came from the abuse of an imperial power such as never before descended, and it is to be hoped will never again descend, upon mortal man. The world is perhaps not yet done with this psychosis, and some evidence of it may be seen in Europe at the present day, but the world does not read the lessons of history and science aright if it does not find in time a preventive, or at least a cure. With the common run this form of degeneracy can be diagnosticated; with tyrants it must be eradicated.

The strange alliance of despotism, lust, and religious devotion is illustrated by several striking examples in this book. It is a well-known syndrome in some forms of degeneracy and insanity. Its influence in history has perhaps not been sufficiently recognized. This association of sexual and religious perversions is the most disgusting anomaly of the insane brain. The mad wretch, Ivan IV. of Russia, who married seven wives and despoiled women without number, who killed 27,000 people at the sack of Novgorod, who slew his own son, and whose reign was one long débauch of power, lust, and blood, wrote piously that he wanted

only the grace of God and of the Holy Virgin Mary, and did not desire the approval of men. He was familiar with Scripture, and combated heresy like a monk. Toghlak was a somewhat similar zealot of Moham-medanism; and the Catholic king Louis XV. of France, went to prayers with a group of favorites from his *parc aux cerfs*. The alliance, still more fatal to human happiness, of religion with despotism, of priest-craft and intolerance with the mad excesses of kings and ministers, has its illustrations, and its lessons, too, in this book. Those who court a return to mediævalism, and, in this age of science, champion dogmas whose history is written in blood, may well read and ponder.

Dr. Ireland gives us a fine sketch of St. Francis Xavier and his mission to the Indies. Why the saint is classed among those who have a blot upon their brains, the author does not expressly state, and some readers doubtless will wonder. We, however, venture to think that the classification is a just one, and that Dr. Ireland, with his usual insight and powers of historical and psychological analysis, has indicated an important truth when he ranks Xavier and those like him with those who see visions and dream dreams. The sufficient vindication for this criticism lies perhaps in the fact that after three centuries all that Xavier and his followers, of all sects, have accomplished in propagandizing among the subtle and intellectual peoples of India, Japan, and China is conspicuously small. The apostle to the Indies, who attempted to introduce the Inquisition into Hindostan, was a strange compound of zeal and shrewdness, bigotry and humanity, self-denial and worldly policy. He had not the saving grace of common sense, and his defenders have not honored his memory by repeating the silly tale that his flesh after death was preserved sweet by a miracle.

The power of a fixed idea on the insane brain is familiar to all alienists, and also the rather more rare phenomenon of the power of contagion that lies in these imperative conceptions. Dr. Ireland turns naturally to the crusades for the best historical instances of the epidemic influence of such fixed ideas. This view of the crusades is the only rational and scientific one. They were the enterprises of a populace which lay under the spell of dark and dangerous delusions, in the squalor and ignorance of the middle ages, when orthodoxy, and not civilization, furnished the motives for the conduct of men. The dancing maniacs, with their manifestations of grand hysteria, were other phases of the same influence.

We cannot follow the author through all the pages of his intensely interesting and instructive book. The work is unique. It is quite original in conception, and very successfully wrought out. It occupies a legitimate field for the studies and the literary labors of scientists and of physicians, and we congratulate the author upon having so successfully shown the way.

J. H. L.

THROMBOSIS OF THE LATERAL SINUS RESULTING FROM SUPPURATIVE MIDDLE-EAR DISEASE, AND ITS TREATMENT. Large 8vo., pp. x., 252. Berlin: A. Hirschwald, 1893.

FINLAND occasionally reminds us that even in distant parts of the world as well as in the great centres there is a literary and a practical surgical activity which produces results of value. It is to that far

neighbor of the Russian Empire that we owe the operation of Estlander, and now another colleague of his in the University of Helsingfors has given us the most complete brochure on sinus thrombosis which has yet been published.

The book consists of two parts, the first of which considers the history of thrombosis of the lateral sinus; then the anatomical relations; next the pathology of the formation of thrombi, especially in the cerebral sinuses, and more particularly the lateral and sigmoid sinuses. This is followed by the etiology, symptomatology, course and duration, diagnosis and differential diagnosis, prognosis, and treatment. This portion is closed by a critical view of the results of the operation and a copious bibliography.

The second part, which constitutes just half the book, consists of a *résumé* of cases, which is of great value, especially to those not having access to the literature. There are: (1) 60 cases of thrombosis of the lateral sinus without meningitis or abscess of the brain; (2) 26 cases of thrombosis of the sinus with meningitis; (3) 13 cases with brain abscess; (4) 14 cases with both meningitis and abscess of the brain; (5) 5 cases in which the complications were uncertain; and finally, and most important of all, a *résumé* of 25 cases in which the disorder has been treated by operation. His tables in the first part are numerous (twenty-eight) and are extremely instructive. They are based on the individual cases which are given in the second part, which seem to have been collated with great care and fidelity, though the list is very incomplete. Of the 25 cases operated on, 15 recovered and 10 died, a mortality of 40 per cent. The reviewer has, however, a list, including these 25 cases, of 74 cases in all, a few of which have been published since FORSELLES' brochure was printed, and could not, therefore, have been included in his tables. Of the 74 cases 49 recovered and 25 died, a mortality of little over one-third. When it is remembered how recently the operative treatment of this condition has been introduced—practically five years ago—this is a surprisingly good showing; and when it is remembered that without operative treatment practically every case would have proved fatal, the greatest possible encouragement can be drawn from these figures. It is strange that in America there has been, so far as we know, but a single case reported—that of the reviewer, in the *Times and Register* of December 20, 1890—and unfortunately this case was seen at so late a period that the result was hopeless, even from the start.

We beg to call the earnest attention of American physicians—especially of neurologists, otologists, and surgeons—to the urgent need for early and radical operation in this easily recognized condition.

Anyone who will consult this admirable monograph of Forselles, as well as Macewen's recent book on the *Pyogenic Infective Diseases of the Brain and Spinal Cord*, will find the symptomatology and treatment exhaustively considered. We hope to see before long a number of cases of successful treatment reported.

W. W. K.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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MEDICAL SCHOOL AND HOSPITAL; ASSISTANT VISITING PHYSICIAN TO BELLEVUE HOSPITAL.

THE PROPERTIES OF THE THYROID AND THE SPLEEN.

DR. FREDERICK GOURLAY concludes from his experiments, that (1) the thyroid does not contain nor yield any peptone or proteose. (2) Its secretion is not mucin, as it yields no reducing sugar on treatment with dilute mineral acid. (3) The only proteid that can be obtained in any quantity from it is a nucleo-albumin. (4) This is derived, at any rate partly, from the so-called colloid matter in the acini. (5) Experiments which had for their object the finding of a ferment in the thyroid, which dissolves mucin, led to negative results; and it is suggested, with all reserve, that the nucleo-albumin is the material to which the thyroid treatment of myxœdema owes its usefulness. (6) Thyroid nucleo-albumin causes intra-vascular coagulation. As regards the spleen: (1) Fresh spleen, like thyroid, is alkaline. (2) Fresh spleen contains neither peptone nor proteose. (3) The proteids which can be extracted from fresh spleen resemble those found in lymphoid structures. (4) The most important of these are a globulin and a nucleo-albumin. (5) The nucleo-albumin, like that similarly obtained from other cellular organs, produces, when injected into the circulation of rabbits, intra-vascular coagulation. —*The Journal of Physiology*, 1894, Nos. 1 and 2, p. 23.

METHYLENE-BLUE IN MALARIA.

DR. ERNST FRATNICH has made use of this remedy in four cases. In each the urine became markedly colored, its amount increased, yet it contained no albumin. As an unpleasant symptom the spasmodic bladder-irritation may arise, but this is controlled by as much powdered nutmeg as can be placed upon the point of a knife. In these cases this symptom was not noticed; the stools and the saliva were colored, but otherwise normal. The dose was about wo grains, given once daily. In three of the cases favorable results were obtained.—*Therapeutische Monatshefte*, 1894, Heft 4, S. 150.

THE ANTI-DIPHTHERIN OF KLEBS.

DR. OSCAR VULPIUS applies the liquid with a long-handled camel's-hair brush, which is readily managed, first to the tonsils and soft palate, and, after thorough cleansing, to the pharynx. With restless children one must be content with imperfect treatment, and even with one application; even the liquid may be expelled by vomiting, before, indeed, it can reach the membrane. The results as noted include a marked subsidence of the fever; the membrane may remain entirely unchanged during the treatment, nor, indeed, does this treatment prevent the tendency of the process to invade the trachea and bronchial tubes, consequently it has no influence in preventing croup. However, as it is important that the remedy shall be brought into close contact with the diseased surface, it should be again applied as soon as the membrane is coughed up. In this series of cases, nineteen in number, the percentage of deaths was 52.6; omitting one case of the rare accident, late secondary hemorrhage after tracheotomy, the rate falls to 50 per cent. Whether with an improved anti-diphtherin, or with possibly a combination with this of a diplococcus poison, better results may be obtained, the future only will determine.—*Deutsche medicinische Wochenschrift*, 1894, No. 6, S. 127.

INOCULATION IN DIPHTHERIA AND MEMBRANOUS CROUP.

DR. W. W. MYERS prepares the substance for inoculation, which he designates as toxalbumin, as follows: The diphtheria bouillon-culture is first filtered, then evaporated to one-third its volume; it is then treated with ten times the quantity of alcohol and acetic acid, and precipitated until a clear liquid is obtained; this is dialyzed for seventy-two hours, and again precipitated with alcohol and dried; the residue is a white substance. The patient is treated by local applications of 4 per cent. solutions. Inoculations made from this substance in the arms of members of the same family resulted in some febrile manifestations, but they did not acquire diphtheria, although this disease has an undoubted tendency to propagate itself by contact from individual to individual.—*The American Therapist*, 1894, No. 8, p. 225.

THE TREATMENT OF SEVERE INFLUENZA.

DR. JUHEL-RÉNOY is a strong advocate of bathing, refrigeration, and alcoholic stimulation in the treatment of these cases. In the cases which are apparently, although not really, severe, small amounts of alcohol, abundant fluids, revulsion by mustard, or dry cupping. For the mild cases, antipyrine or salipyrine, in doses of from thirty to sixty grains in the twenty-four hours; but this medication must be limited to those whose kidneys are acting well. If this precaution is not observed antipyrine is as dangerous here as it is in other profound and lasting infections.—*Journal des Praticiens*, 1894, No. 19, p. 217.

THE TREATMENT OF PNEUMOTHORAX IN THE TUBERCULOUS.

DR. JUMON immediately relieves the violent pain by a subcutaneous injection of morphine. The dyspnoea may be relieved by dry cupping; oxygen

inhalations are likely to be of benefit. Injections of ether and caffeine ward off the collapse. Thoracentesis, done under antiseptic precautions, relieves the pressure upon the lungs, heart, and the great bloodvessels; and if the communication with the bronchi is free, it may be repeated several times. When the secondary empyema appears the liquid may be aspirated, and its bulk replaced by sterilized air, or the germs may be sterilized by antiseptic injections of solution of tincture of iodine, alcohol, and potassium iodide. Thoracotomy is indicated in a very abundant accumulation of purulent material, which is likely to give rise to septicæmia,—*Revue de Thérapeutique Médico-Chirurgicale*, 1894, No. 6, p. 159.

ETHER VS. CHLOROFORM NARCOSIS.

DR. W. KÖRTE believes that the kind of chloroform (English, chloral, or Pictet) makes but little difference; accidents have been observed with all. Deaths may take place in healthy individuals, with sound hearts, before the onset of anæsthesia; in general as 1:2907 chloroform anæsthesias. Gurlt collected the statistics of 14,646 ether-narcoses without death. In a study of 600 cases of ether-narcosis, it was found that under ether the pulse was fuller, stronger, and sudden diminution in the heart-strength was absent; vomiting rarer than with chloroform; after-vomiting is very rare; in over one-third of the cases albumin was found in the urine either before or after the narcosis. Bronchitis of a mild sort was observed, but severe catarrh and pulmonary inflammations were not observed. Ether is not to be used in operations upon the face and mouth. The danger from fire demands certain precautions. Disturbing symptoms did not arise; there were only three instances of respiratory disturbance, with good pulse. The general conclusions are that ether is a slower but less dangerous anæsthetic. Deaths have taken place from ether, and will take place, but they are less frequent. The incidents of narcosis do not appear so quickly as with chloroform, and, indeed, are more amenable to treatment.—*Therapeutische Monatshefte*, 1894, Heft 3, S. 125.

THIOFORM.

DR. JOH. JULIUS SCHMIDT states this drug possesses, over iodoform, the advantages of odor and freedom from danger, so that it may be used over large wound areas without danger. Internally it appears to be an acceptable intestinal antiseptic. It is a cheap, innocent, and pleasant dry dressing for wounds, without producing untoward symptoms, and aside from its general surgical applicability, it is especially useful in the healing of large wound-surfaces, as after burns or ulcerations.—*Therapeutische Monatshefte*, 1894, Heft 4, S. 164.

THE TREATMENT OF AMENORRHEA.

DR. PANECKI cites, amongst other remedies, the good results obtained from a grain of santonin administered at night, and also the use of potassium permanganate in from one- to two-grain doses thrice daily. Probably the most useful remedy is iron. Brandt's method of irritating the uterine mucous

membrane by the introduction of sounds may result in a single flow, but can only be used in exceptional cases. In the use of electricity it is believed that the faradic current is the best, both poles being introduced into the uterine cavity, antiseptic precautions being observed. In choosing the current, that from a coil of wire thick and short, a current of quantity rather than of tension, is preferred. In case of imperfect development in uterus and ovaries, the current of tension, long and thin wire, may be preferred. The number of applications vary in number from five to thirty, and the duration from five to fifteen minutes. As to the commencement of the treatment, if the amenorrhœa is extreme, it should be begun immediately after the molimen, and continued daily; if it is slight, for ten days before the expected period will be sufficient.—*Therapeutische Monatshefte*, 1894, Heft 3, S. 110.

QUININE AS A REMEDY FOR ENURESIS.

DR. CHARLES S. POTTS believes that enuresis is probably caused in a large number of cases by the failure of the higher centres to properly control the reflex act by which one empties the bladder, associated with a general lack of muscular power and tone; it seemed rational, as quinine is a stimulant to the inhibitory centre, that it would prove useful. Two successful cases are reported, although the quinine seemed to lose its effect in time, necessitating an increase of dose.—*Therapeutic Gazette*, 1894, No. 4, p. 217.

BISMUTH SUBGALLATE (DERMATOL) IN DERMATOLOGY.

DR. J. ABBOTT CANTRELL sums up his experience in the use of this drug as follows: (1) The drug may not be toxic; this property was not investigated. (2) It is not superior to other iodoform substitutes, as iodoform and aristol. (3) It does not hinder, but rather increases discharge. (4) It is decidedly irritating. (5) It is a stimulant, rather than an astringent. (6) It cannot take the place which has been allotted to it.—*Therapeutic Gazette*, 1894, No. 4, p. 234.

THE VALUE OF SUGAR AND THE EFFECT OF SMOKING IN MUSCULAR WORK.

DR. VAUGHAN HARLEY, from an elaborate series of experiments, has arrived at the following conclusions: (1) The periods of digestion, as well as the kinds of food taken, have a marked influence on voluntary muscular energy. (2) Irrespective of the influence of food there is a periodical diurnal rise and fall in the power of performing muscular work. (3) More work can be done after than before midday. (4) The minimum amount of muscular power is in the morning, about 9 o'clock; the maximum about 3 P.M. (5) Regular muscular exercise not only increases the size and power of the muscles, but has the effect of markedly delaying the approach of fatigue. (6) The amount of work performed on a diet of sugar alone is almost equal to that obtained on a full diet; fatigue, however, setting in sooner. (7) In fasting, large quantities of sugar (sixteen ounces) can increase the power of doing muscular work during thirty voluntary contractions from 26 to 33 per cent., and the total gain in a day's work may be 61 to 76 per cent., the time

before fatigue sets in being also lengthened. (8) The effect of sugar is so great that when added to a small meal it can increase the muscular power during thirty contractions from 9 to 21 per cent., while the total increase of work may be from 6 to 39 per cent., the approach of fatigue being at the same time retarded. (9) When added to a large, mixed meal, sugar can increase the muscular power of thirty contractions 2 to 7 per cent.; the increase in total work being 8 to 16 per cent., and a marked increase in the resistance to fatigue is shown. (10) Eight ounces of sugar taken in addition to a full diet, increases the day's work. The work accomplished during thirty voluntary contractions shows a gain of from 6 to 28 per cent., the total day's work giving an increase of power 9 to 36 per cent., and the time before fatigue sets in being lengthened. (11) Moderate smoking, although it may have a slight influence in diminishing the power of doing voluntary muscular work, neither stops the morning rise nor, when done early in the evening, hinders the evening fall. (12) Sugar taken early in the evening is capable of obliterating the diurnal fall in muscular power that occurs at this time, and increases the resistance to fatigue.—*Journal of Physiology*, 1894, Nos. 1 and 2, p. 97.

THE ANTISEPTIC PROPERTIES OF OIL OF CINNAMON.

DR. D. BRADEN KYLE has used the Ceylon oil in the treatment of infective varieties of nasal, laryngeal, and aural affections, with marked success. He explains the action of the oil as follows: The germ being an albuminous compound, composed mainly of nitrogen, oxygen, and hydrogen, and being enclosed in a capsule of varying thickness, the chemical composition of which is cellulose, when brought into contact with the active principle of the oil, the cinnamic acid, has its cell-wall contracted, which practically deprives the germ of its nutrition. By microscopical examination this theory is confirmed. In cases in which the solution of the oil, 1 : 500, was put to the clinical test the wounds healed by first intention. However, it is not a safe antiseptic for surgical work, but it is a good mucous membrane antiseptic. It is not, however, a germicide.—*Therapeutic Gazette*, 1894, No. 4, p. 232.

THE MECHANICAL TREATMENT OF ANASARCA.

DR. H. CURSCHMANN recalls the fact that for many years, and even now, incisions are resorted to in marked anasarca, although the tendency toward erysipelatous infection in the œdematous skin is very great. It is necessary to make as small and as few incisions in the skin as is possible, and experiments have been made with small canulas, needles of hypodermatic syringes, the finest possible trocars. Southey's trocars [formerly better known] have been used, the form of the canula and the point of the trocar having been modified, although these are uncomfortable and even painful for the patient. With this, as well as the other method, absolute antiseptics must be secured. Since 1882 he has employed a small glass funnel, which is placed over the site of the incision, and which is connected with a rubber tube leading to a receptacle for the escaping fluid. The fluid is thus rapidly removed, and the wound is protected from harmful outside influences, for the funnel can be attached to the skin by adhesive plaster or by iodoform collodion. Of late he has devised an instrument built upon the plan of the funnel, but with a

broader base of hard rubber, and a removable top of the same material, the side, however, being of glass. The base can be placed in position upon the skin, which has been previously sterilized, and secured as above. The incisions, three or four at most, are then made, the cover tightly placed upon the base, and firmly held by a bayonet joint, the conveying tube filled with the physiological salt solution, and the distal end is placed in the lowered receiving-glass. This apparatus operates successfully, and has given great relief in diminishing the anasarca, as well by indirectly emptying the serous cavities, and affords the opportunity for the successful use of internal remedies.—*Therapeutische Monatshefte*, 1894, Heft 3, S. 95.

INTRAVENOUS INJECTIONS OF CORROSIVE SUBLIMATE.

DR. GUIDO BACCELLI has found in his experimental work upon animals that the fears as to the results of these injections, so far as concerns the blood, were unfounded. In two patients suffering from cerebral syphilis, when the ordinary methods of internal administration, inunction and hypodermatic injection in large doses had failed, the new method gave brilliant results. The usual solution is as follows: Corrosive mercuric chloride, 1; sodium chloride, 3; distilled water, 1000. The skin must be treated with careful aseptic methods, a vein in the elbow, the back of the hand, or the leg is selected, after that the vessels are overfilled by a bandage proximally placed. The needle of the filled syringe is inserted, and the injection made into the vein; the absence of pain and subcutaneous swelling indicates that the vein has been entered. In one case the metallic taste of the mercury in the mouth was noted by the patient after a few seconds. A flow of saliva followed in five or six minutes. The first dose was $\frac{1}{8}$ gr. of the remedy, and it was increased to $\frac{1}{2}$ gr. per day, which has not been exceeded. The advantages are: (1) The small quantity of the remedy necessary; (2) the possibility of rapidly combating the symptoms which are due to the direct blood-poisoning caused by the syphilitic virus; (3) the prompt action of the remedy upon the walls of the bloodvessels, which are the favorite seat of syphilitic degenerations; (4) the immediate carrying of the drug in the blood-current to all tissues and organs.—*Berliner klinische Wochenschrift*, 1894, No. 13, S. 301.

MEAT PEPTONE AS A HEART TONIC.

HERR E. KEMMERICH notes that the "Fleischpepton," which is made in South America by heating beef in closed tubes with steam under pressure, will make the pulse full and strong; yet of this there has been hitherto no exact clinical demonstration. The observations were made in the morning, the patient remaining in bed. About one ounce of the peptone was dissolved in a half-cup of hot water, a small quantity of salt being added, and cooled to blood-heat. On looking over the curves of the sphygmograph it is evident that the rate is not quickened, but rather slowed; the changes indicate that there is, under the influence of the peptone, a stronger contraction of the cardiac muscle, especially of the left ventricle. These changes are most marked after three-quarters of an hour; frequently, however, they may commence as early as fifteen minutes, and usually disappear in

about six hours. The composition of this peptone may explain its action. It consists of albumoses, 30; peptone, 18; other soluble albuminous bodies, 9 to 12 per cent., making a total of 57 to 60 per cent., besides the extractives and 8 to 10 per cent. of potassium phosphate and chloride and earthy phosphates. The large percentage of albumoses and peptones present a readily absorbable material for the nourishment of the heart muscle, while the potassium phosphate and chloride add to the action of the potash salts, which, through the raising of arterial pressure and slowing of the pulse, act as diuretics. The aromatic extractives are weak nerve-stimulants, and at the same time are excellent correctors of the taste of the albumoses, peptones and potash salts. The patients perceive a feeling of warmth, an increase of the appetite, and in consequence of the better circulation of the blood there is an improvement in the general condition. Further, in consequence of its tonic effect on heart and bloodvessels, the peptone is a mild diuretic.—*Berliner klinische Wochenschrift*, 1894, No. 10, S. 238.

THE INFLUENCE OF VARIOUS DIETS UPON THE COMPOSITION OF THE URINE.

DR. W. HALE WHITE has found that, in his experience, strontium lactate will sometimes diminish albuminuria, but he has been unable to detect that the condition of the patient is in any other respect altered by taking it. Milk has been frequently recommended; it is said that it will diminish the amount of albumin. This is far from being always true, especially in chronic interstitial nephritis, and even if it were, in many cases there is no proof that this is of any benefit. It is urged that milk is easily digested and absorbed; often this is directly contrary to fact, for patients who are fed solely upon milk often suffer from indigestion; they get to positively loathe the milk, which has the additional disadvantage that it leads to constipation. It has been stated that milk does not irritate the kidneys; in young children, however, it is curious to find that these organs are frequently streaked with urates. Milk is often said to be diuretic; it is usually but not invariably diuretic, and it is doubtful whether it is well to give diuretics in Bright's disease. It has been urged that milk is beneficial because it contains no toxic substances; it may contain poisonous substances, which, although excreted in health, are retained in the blood in Bright's disease, and there is no proof that it aids in the elimination of toxic substances. Ten cases were analyzed, the composition of the daily diets being: 1. Milk; 3 pints, equalling 1076 grains of proteid; 2. Farinaceous; bread, 12 ounces; butter, 1 ounce; milk, 2 pints; beef-tea, 1 pint, equalling 1137 grains of proteid; 3. Full; bread, 12 ounces; butter, 1 ounce; milk, $\frac{1}{2}$ pint; potatoes, $\frac{1}{2}$ pound; meat, 6 ounces, equalling 1522 grains of proteid. With the full diet, rice pudding made with milk, $\frac{1}{2}$ pound; or mutton broth $\frac{1}{2}$ pint, were given on alternate days. When any of the patients showed signs of uræmia they were treated with subcutaneous injections of pilocarpine nitrate, vapor baths, compound jalap powder, or compound elaterium powder. In conclusion: The quantity of urine passed: In chronic interstitial and in chronic parenchymatous nephritis milk is sometimes, although not always, a mild diuretic. Upon a farinaceous diet more urine is passed than upon a full diet, often considerably more, but there is not much

to choose between farinaceous and milk diets. The specific gravity: The diet has no certain influence in either chronic interstitial or chronic parenchymatous nephritis, but on the whole it is lower in milk and farinaceous diets than in full diets. The amount of albumin passed: Milk diet has little or no effect in reducing albumin in urine, sometimes, indeed, more albumin is passed upon milk than upon other diets; the albuminuria in chronic interstitial nephritis is much more severe in a farinaceous than in a full diet. In chronic parenchymatous nephritis the albuminuria is much more profuse upon a full diet than upon a farinaceous. The quantity of urea passed: It is difficult to say what is the effect of milk upon the excretion of urea; in contrasting full with farinaceous diet there is no certain influence upon the output of urea in chronic interstitial nephritis. In the chronic parenchymatous nephritis the urea excreted is often less the more proteid the diet contains. The general condition of the patient: The patients feel better and stronger on full diet, or on farinaceous diet, with fish or chicken added, than they do on milk or farinaceous diets, and this conclusion applies to both forms of nephritis. He believes that an ordinary full diet is the best for chronic Bright's disease, for, 1, it does not increase the liability to uræmia; 2, the general condition of the patients improve upon it, and they feel stronger and their circulation is better than upon milk or farinaceous diet; 3, a saving of albumin is effected, for even if the output is increased, more than sufficient extra proteid is taken in to compensate for the extra loss; 4, there is no evidence that the effect of this diet upon the excretion of the urea is harmful; 5, there is no evidence that a full diet contains, or especially leads to the formation of, any toxic principles which are harmful in chronic Bright's disease; 6, this diet prevents the repugnance felt by these patients to farinaceous diet, and their loathing of milk.—*Medico-Chirurgical Transactions*, vol. lxxvi. p. 392; also in *British Medical Journal*, 1893, vol. i.

THE CREOSOTE TREATMENT FOR TUBERCULOSIS.

DR. JULIUS WEISS presents a very careful review of the present condition of the creosote therapy. Increase of weight, diminution of cough and an arousing of the appetite are, in most cases, observed during the administration of this remedy; yet frequently patients are found who cannot tolerate the taste of the remedy, nor be induced to take it. If pills or capsules are not well borne, Hoffman's mixture (with tincture of gentian), or Bouchardat's formula (tincture of nux vomica and Malaga wine), or Van der Vloet's prescription (with tincture of nux vomica) may be substituted. Sommerbrodt used the remedy in gelatin capsules with cod-liver oil; balsam of tolu should be avoided because the pills are thus rendered insoluble; sugar-coated pills are not, however, objectionable. If creosote in these various forms cannot be taken the carbolate is generally well borne in large doses, and is equally as efficacious as the creosote itself. It can be said that creosote is not a direct specific against tuberculosis, but indirectly influences the process in the lungs by limiting the formation of expectoration and by its being a good stomachic. The majority of physicians will subscribe to the statement of Weyl, that it is the best remedy for the symptomatic treatment of tuberculosis.—*Centralblatt für die gesammte Therapie*, 1894, Heft 3, S. 129.

MEDICINE.

UNDER THE CHARGE OF

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EPILEPTIC SIALORRHOEA.

FÈRE (*Compt.-rend. hebdom. des Séances de la Soc. de Biol.*, x. sér., t. i., p. 258) has reported the case of a man, twenty-seven years old, who had had convulsions in infancy, and attacks of epilepsy and of vertigo from the age of seventeen. His father was alcoholic, and a brother was an imbecile. The attacks were characterized by their extreme violence, the movements appearing first in the face, but soon becoming generalized. The man always fell, usually upon his face, and almost always bit his tongue and passed urine involuntarily. The post-paroxysmal stupor was continued into a sleep lasting two or three hours, without return of consciousness. Salivation was always extremely abundant. Under the influence of bromides in increasing doses the frequency of the attacks was diminished and their character underwent some change. At the age of twenty there occurred about six convulsive attacks and eight vertiginous attacks monthly, while at the age of twenty-seven, while taking two hundred and fifty grains of bromide daily, there were no attacks of vertigo, and only six incomplete convulsive attacks. These attacks consisted in the occurrence of sudden pallor, marked convergence of the eyes, drawing backward of the head, stiffness of the whole body, but without falling, although with loss of consciousness. The mouth opened widely, the lower lip was shaken by rapid movements, and a copious discharge of saliva took place, continuing for some time after the rigidity had ceased and consciousness had been restored. On one occasion the amount was found by measurement to be more than two ounces and a half, and on another occasion nearly four ounces. In addition to these attacks the man had, from time to time, sudden transient discharges of saliva, without loss of consciousness and without vertigo. Reference is made to a case, previously reported, of a paretic dement in whom epileptiform attacks, in which the movements first appeared in the face, were also preceded by copious salivation. These two cases, together with results of physiologic experiments, are made the basis of the opinion that the anterior portion of the cerebral cortex, in the neighborhood of the centres for the movements of the face, contains a centre, excitation of which causes increased secretion by the salivary glands.

HEPATIC CIRRHOSIS FROM GASTRO-INTESTINAL AUTO-INTOXICATION.

AT the recent International Medical Congress, HANOT and BOIX (*Wiener medicin. Presse*, No. 15, p. 577) described a form of cirrhosis of the liver which did not well fit, etiologically, into any of the established categories. The cases thus affected may occur in adults between thirty-five and fifty-five years old, the liver at the height of the disease being large and extending for several fingerbreadths below the costal margin, its surface being smooth and even and presenting a thickened and readily palpable margin. The viscus is remarkably hard, and manipulation occasions no pain. The spleen is not enlarged; there is no ascites; no alteration in the venous abdominal circulation, and no jaundice, although in some cases there is a slight urobilin-discoloration of the skin. The urine is in most instances normal, though it may contain urobilin and sometimes albumin in small quantity; sugar is not found. In all of the cases of this group a history of alcoholism can be definitely excluded; while tuberculosis, syphilis, malaria, and other infectious diseases cannot be demonstrated. These cases do, however, present a history of digestive derangement extending over many years, with or without gastrectasia. In cases long under observation the progressive enlargement of the liver may be evident, while the characteristic hardness is present from the outset. After having reached a certain degree of enlargement the liver remains stationary in size, even for a period of many years. The functional disturbance is slight. In addition to the derangement of digestion, there may be a feeling of heaviness in the right hypochondrium, tympanites, habitual constipation, and a certain lassitude that makes muscular effort difficult and leads readily to fatigue. There may also be acute attacks of usually transient disturbance, especially of the gastric functions, in the course of which the liver may be observed to increase in size, and the urine to contain urobilin. There may also be attacks of perihepatitis simulating hepatic colic. Histologically, a general sclerosis of the portal spaces may be found, with preservation of the central vein. The interlobular connective tissue extends in varying degree into the lobules themselves; but there is no hyperplasia of the biliary ducts. The origin of this form of sclerosis is to be attributed to the long-standing digestive derangement, in consequence of which toxic substances are generated in the gastro-intestinal canal. These are absorbed by the veins, and must find their way through the liver by the portal vein, giving rise in their passage to irritation and cellular proliferation. The prognosis as to life is not unfavorable, although individuals thus affected are more prone to infectious diseases than are healthy persons. The prognosis depends upon the condition of the liver-cells. Therapeutically, the causative gastro-intestinal derangement is to be corrected and infection is to be prevented by the administration of intestinal antiseptics.

A CASE OF WORD-BLINDNESS, OR OPTIC APHASIA.

BIANCHI (*Berliner klinische Wochenschrift*, 1894, No. 14, p. 333) has reported the case of a printer, seventy-one years old, who for several months had been having attacks of vertigo, with loss of consciousness, as well as epileptic seizures. A severe paroxysm of the latter was followed by right hemiplegia

and aphasia. Motility was soon regained, but the defect of speech persisted. It was found that common sensibility and the muscle-sense were impaired, while the thermic sense, the sense of pain, and that of pressure were preserved. Vision had for some time been lost upon the left side by reason of the presence of a cataractous lens. There was considerable limitation of the field of vision upon the right, the temporal side being hemianoptic. Hearing was impaired upon both sides. Taste and smell were preserved. The pupils reacted tardily to light and in accommodation. Motility was intact, except for a slight degree of paresis of the muscles of the left side of the face. Speech was notably affected. The patient comprehended what was said to him, but was unable to answer. Speech was broken and jerky, and, particularly when a sentence was begun with a pronoun, a verb, or an adverb, there was an inability to proceed. Nouns especially seemed wanting. If the word was supplied, it was at once repeated with evident satisfaction. Speech was notably deficient in the names of classes and persons. The man would forget his own name. Articulation *per se* was perfect. The power of reading was lost, although occasionally a syllable could, with a great effort, be read, but two or more syllables could not be connected. The man could write well upon dictation, but on writing spontaneously he would make many mistakes. Transcription was not at all possible. There were at times visual hallucinations, evidently affecting the right half of the visual field. While under observation the man had numerous left-sided epileptic attacks, and in one of these death took place. Upon post-mortem examination, a small area of softening was found in the right hemisphere in the outer segment of the lenticular nucleus; another was found in the white matter of the first frontal convolution, close to its foot; an old similar area was further found in the corpus callosum in relation with the splenium, extending upward to the precuneus, of which it involved the lower third, and through the gray matter to the white. In the left hemisphere there was an old area of softening in relation with the angular gyrus, destroying the gray substance of the first temporal sulcus in its posterior portion; another area not involving the first and second temporal convolutions, but extending through the white substance of the angular gyrus to the posterior horn of the lateral ventricle, leaving free, however, the gray substance of the occipital lobe. Any relation between the verbal amnesia and the lesions in the right hemisphere is to be excluded, principally because the disturbance of speech appeared after the attack that caused the transient right hemiplegia. It is pointed out that memory-images of mind-speech are not always derived from the word-auditory centre, but in some special cases from the word-visual centre. Heredity, education, occupation, etc., may so fortify visual impressions that these may preponderate in the mechanism of speech, so that speaking and writing may be performed independently of auditory memories. It is considered evident that under these conditions there is a connection between the verbal-auditory centre and the verbal-visual centre, so that a destruction of the latter leads not only to simple alexia, or even blindness—the absence of memory-images of speech in this case prevents the exercise of the motor function of speech and writing, and as the individual is blind for written language, he is rendered amnesic for spoken as well as written language. The case reported illustrates the influence of occupation upon disturbance of function. Having been a printer

for many years, a close relation had been established between the visual images of letters, syllables, and words and the corresponding motor conceptions, more so than between these and auditory images. As a result the auditory images were incapable of arousing the visual images, and by reason of defect in the visual organs the patient could not reproduce images of words, and could not thus give expression to thought in words.

SYRINGOMYELIA, WITH LESIONS OF THE SKIN AND MUCOUS MEMBRANES.

NEUBERGER (*Wiener medizinische Presse*, 1894, No. 12, p. 445) has reported the case of a man, forty-three years old, who presented numerous areas of ulceration, some thirty in number, of irregular outline and varying size, all over the body. There were, besides, pigmented areas in places and radiating cicatrices in other places. Seven years previously it was believed there had been syphilitic infection, followed in the course of a few months by painful ulceration and swelling of the tongue. This phenomenon recurred from time to time, despite careful constitutional and local treatment, the individual attack, however, usually subsiding in within a week or two weeks. Excellent results followed potassium iodide in doses of 15 grains, increased in the course of a few days to 30 grains three times daily, daily subcutaneous injections of euorphen, gr. $\frac{1}{2}$, and applications of mercurial plaster. The peculiar involvement of the mucous membrane of the mouth returned, however, at almost regular intervals, until death took place rather suddenly. These attacks usually set in suddenly with a sense of intense burning in the tongue, and the appearance, particularly at the tip and along the right border, of small vesicles, that soon ruptured and left small ulcerated areas that were extremely painful and greatly interfered with speech and rendered impossible the ingestion of solid food. These patches were, at first, of roundish outline and covered with a yellowish deposit and surrounded by a reddish areola, but after a time they tended to become confluent. At a later period the left border of the tongue also became affected. In a little while the entire organ became enormously swollen. In the intervals between the paroxysms ulceration sometimes took place in the fissures present. On no occasion was there fever. At the times of the attacks there were also pricking sensations in the face. Sometimes, too, the tonsils were swollen and the seat of a yellowish deposit. The condition affecting the mucous membrane of the mouth and pharynx was believed to be pemphigus, non-syphilitic in character. On one occasion an eruption of vesicles was observed upon the extensor aspect of the right hand, and on another occasion a similar eruption on the middle toe of the left foot. A short time before death it was observed that while common sensibility was everywhere intact, there was total analgesia in various parts of the body. The man was able to discriminate heat from cold. Death took place suddenly amid manifestations of asphyxia. Upon post-mortem examination the tongue was found swollen, fissured, and ulcerated. The epiglottis was enlarged and reddened. The entrance to the larynx was closed by intense edema of the ventricular bands. The mucous membrane of the larynx was thick and rugous, in places eroded, and here and there, particularly upon the arytenoid cartilages, presenting frothy, yellowish secretions, probably

derived from the rupture of pre-existing vesicles. The mucous membrane of the trachea was hyperæmic, swollen, and covered with frothy secretion. The central canal of the spinal cord was found dilated, and, besides, there was an adventitious cavity, particularly marked in the cervical and dorsal segments, and involving the right posterior horn. In a summing up of the case, the opinion is expressed that death resulted from an eruption of vesicles in the larynx, with consecutive œdema of the ventricular bands. The question of syphilis is believed to be doubtful, and the possibility of a relation between the lesions of the epithelial surfaces and the spinal process is suggested. Brief reference is made to a case of syringomyelia with cutaneous lesions, previously reported.

ACUTE ASCENDING PARALYSIS.

JOLLY (*Berliner klinische Wochenschrift*, 1894, No. 12, p. 281) has reported the case of a man, forty-one years old, who was rather abruptly seized with a sense of heaviness in the lower extremities, progressing in the course of a few days to complete paralysis. The upper extremities then became similarly involved, though not to the same degree. There was, besides, some difficulty of speech and of respiration, and impaired mobility of the face, with increased frequency of the pulse and slight elevation of temperature. There was likewise some weakness of the muscles of the neck, so that the head could scarcely be raised or rotated. The eyes could not be firmly closed, and there was some difficulty in mastication. The external rectus muscle of either eye was palsied. The left pupil was larger than the right and both pupils reacted but feebly to light, but well in convergence. Distant vision was fairly good, but near vision was distinctly impaired. Optic neuritis was found upon both sides and the right disk was the seat of quite extensive hemorrhage. Sensibility was impaired, particularly in the hands and feet. Some of the muscles of the forearm, of the leg, and of the face, displayed reaction of degeneration. The activity of the sphincters was preserved. The knee-jerks were wanting. The man had previously been in robust health, but on inquiry it was elicited that he had for a long time drank beer in large quantity, and that he used tobacco to excess. As time went on the symptoms slowly but progressively improved. The case was diagnosticated as one of multiple neuritis presenting the character of acute ascending paralysis. From numerous considerations the conclusion is reached that most cases of acute ascending or descending paralysis owe their origin to multiple neuritis or to localized myelitic or metencephalitic processes or to combination of these conditions, although under certain circumstances the causative agency (intoxication or infection) may be effective without discoverable microscopic change.

CYST OF THE CEREBELLUM.

JACKSON and RUSSELL (*British Medical Journal*, No. 1730, p. 393) have reported the case of a man, thirty years old, who came under observation with symptoms that were believed to depend upon the existence of a tumor of the cerebellum. Three years previously he had suffered with headache, vomiting, staggering with a tendency to fall backward, and with attacks of

vertigo. He had, besides, other attacks, in which it was doubtful whether he lost consciousness or not. All of the symptoms disappeared with the exception of the headache, which, however, had been present for four or five years, but which previously had been relieved by correcting the co-existing constipation. A year later the man was thrown down, striking the back of his head; he was also kicked on the head, but he did not lose consciousness and was quite well the next day. Six months after this, in diving, he struck the vertex of his head on a stone and was made unconscious for half an hour. He vomited from time to time for five weeks, and was then well enough to resume his duties as a police constable. A year before coming under observation vomiting would occur nearly every morning on arising from bed, before food was taken, and also during the day, especially after meals. On looking up or on suddenly looking round to either side, the man became giddy and his sight dim, but the giddiness passed off in a few minutes if the eyes were closed. If he turned abruptly in bed at night he felt giddy and stupid, and it took some time for him to be sure of his position. When giddy there was always a tendency to fall backward, and on several occasions the man actually fell. Pain had first been felt in the forehead, then in the occipital region, and finally at the vertex and the centre of the head. The symptoms gradually progressed. For six weeks there had been jerkings of both hands and feet, but the face was never drawn, and speech was not affected. Vision had been notably impaired for six days. A year before there had been ringing in the ears for a period of three months. There was no history of syphilis and no evidence of hereditary predisposition to malignant or tuberculous disease. The patient was well developed, but pale, worn, and drowsy in appearance. Speaking and thinking evidently required effort. Percussion of the skull elicited general tenderness, no one point, however, being more sensitive than another. The sense of smell was less acute on the right than on the left. Vision was 6/9 on the right, 6/6 on the left. There was intense bilateral optic neuritis, but no hemianopsia. There was neither ptosis nor strabismus, but on lateral deviation the globes moved in a "punctated" manner, and there were occasional nystagmoid jerks. The pupils were 5 mm. in diameter and equal; they reacted normally to light and on accommodation. The functions of the motor and sensory divisions of the fifth nerves were preserved. The only evidence of asymmetry of the face consisted in a trifling drooping of the right angle of the mouth, apparent, also, on showing the teeth; but on smiling and closing the eyes the facial movements on the two sides were equal. The power to raise the eyebrows and to frown was lost, and there were no transverse lines across the forehead. The ticking of a watch was heard at a distance of six inches from either ear. The tongue deviated slightly to the right when protruded, and was tremulous. The uvula was slightly deflected to the left, but the movements of the palate were equal on the two sides. The palatal reflex was present and was alike on the two sides. There was no dysphagia. Sensibility was everywhere preserved. Active and passive movement of the head on the trunk was restricted in all directions, as every change in the position of the head was attended with pain, so that the patient was afraid to move it or to allow it to be moved. There was no rigidity of the muscles, though there was occasionally a feeling of stiffness. The patient was right-handed, and

the dynamometer registered 120 on the right and 100 on the left. The muscular sense in the upper extremities was normal, but in attempting to touch the nose, with the eyes closed, the left hand was slightly at fault. There was no rigidity. The tendon-reflexes were well marked and slightly the more pronounced upon the left. The superficial abdominal reflexes were present and alike upon the two sides. There was slight but distinct weakness of the muscles of the back, associated with some degree of lordosis on standing with the feet close together. The abdominal muscles shared in this weakness. The plantar and cremasteric reflexes were the less marked upon the left. The gait was reeling, but there was no waddling. The left lower extremity was slightly stronger than the right. There was no rigidity, but the knee-jerks were increased, the right more than the left; there was ankle-clonus on the right side and only a tendency to clonus upon the left. The muscular sense was slightly defective, with a tendency to fall to either side or backward. The man could stand steadily with the feet in apposition when the eyes were open, but swayed when the eyes were closed. Constipation existed. There was some weakness of the detrusor urinæ. Sexual power was not altered. There was no respiratory or circulatory lesion. While under observation, after a day of severe headache, attended with occasional vomiting, the man suddenly lost consciousness and his breathing ceased, although his pulse continued fairly good. Artificial respiration was at once instituted and persisted in for eight hours and a half, when the heart stopped beating. The pulse kept up well for some hours, but gradually became weaker. The post-mortem examination revealed a cystic condition of the cerebellum. On cutting through the inferior velum and raising the medulla the fourth ventricle was seen to be widened; its floor was normal, but its roof was formed by the thin transparent floor of a cyst. The posterior wall of the cyst was gelatinous and uneven, possibly indicative of tumor, but the anterior wall was smooth. The cyst also excavated the lateral lobes, notably the left. The medulla was flattened, as were the cerebral convolutions, and the lateral ventricles of the cerebrum were dilated. The opinion is expressed that the condition of paresis of the muscles of the trunk was a direct result of the destruction of cerebellar tissue, and not a secondary effect resulting from pressure by the cyst upon the pyramids. Otherwise, it would have been reasonable to have expected to find marked loss of power in the lower extremities.

EMBOLIC HEMIPLEGIA IN THE COURSE OF VARIOLA.

DAVEZAC AND DELMAS (*Journal de Médecine de Bordeaux*, 1893, No. 38, p. 421) have reported the case of a woman, thirty-three years old, who had never been vaccinated, but who was exposed to variolous infection, and developed an attack of the confluent form of the disease. During convalescence she was seized with a convulsion in which she became unconscious. When consciousness was resumed it was observed that the left arm and leg were paralyzed. The convulsive seizure had been preceded by a feeling of pain in the abdomen, as if a tumor present were being twisted. Those who witnessed the attack stated that the jaws were moved and the teeth ground. The lids were alternately opened and closed actively, and the eyes were rolled upward. Upon examination, the eyes and pupils were found to be normal,

and the face perfectly symmetrical. The left leg and arm were completely paralyzed, but sensibility was not altered. The spleen was slightly enlarged. The heart presented no lesion, and the vessels were soft, though a little tortuous. The activity of the sphincters was preserved. The knee-jerk was diminished upon the left. The temperature was 103°. The respiration was accelerated and jerking. The percussion-resonance was impaired at the base of the left lung, and the breath-sounds appeared distant. At the base of the right lung fine subcrepitant râles could be heard. The woman gave a history of having had enteric fever at the age of eighteen years, of scarlatina at twenty-one, and of influenza at thirty-one; but there was no history and no evidence of syphilis. Therapeutic attention was directed to the pleuro-pneumonia at the base of the left chest, but despite vigorous treatment a large effusion accumulated. The palsy displayed a tendency to recede. In the course of two weeks dyspnoea became so marked and the general condition so poor that thoracentesis was decided upon, and about a pint of pus was evacuated. Under continued treatment for the next week a tendency to improvement was evinced. At the end of this time, however, while the patient was quietly taking her dinner, an hour after irrigation had been practised, she was suddenly seized with an epileptiform attack, attended with loss of consciousness. A series of four attacks occurred in rapid succession, terminating in death. Upon post-mortem examination, the pleuro-pneumonia was found to be doing well and not of a tuberculous character. The right lung was congested in its inferior third. The heart was small, and presented on its surface several areas of adherent pericarditis. The vessels were not atheromatous. The tracheal and bronchial glands were indurated, but not tuberculous. The kidneys were pale and little increased in size. The liver and the spleen presented a similar appearance. The left cerebral hemisphere was perfectly healthy throughout. The right hemisphere was injected and depressed beneath below the general level in the posterior and superior portion of its middle third. At several points the cortical structure in this situation came away with the membranes, the removal of which disclosed an area of acute softening, extending from the median boundary of the convexity almost to the fissure of Sylvius. This area was brownish-red in color, with a few yellow points in its midst. Above, it involved the cortex to a depth of more than half an inch, and below to a depth of one-fifth of an inch. It included the summit and the posterior half of the ascending parietal convolution, and the adjacent portion of the superior and inferior parietal lobules. The middle of this area was traversed by the third branch of the Sylvian artery. It is believed that at the time of the first convulsion the third branch of the left Sylvian artery was occluded by an infective embolus, the presence of which in turn gave rise to the development of an encephalitis with softening.

SURGERY.

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 SUB TROCHANTERIC OSTEOTOMY.

KIRMISSON (*Rev. d'Orthop*, March, 1894) reports four cases of congenital luxation of the thigh, in which, on account of their advanced age, with pronounced flexion, associated with considerable adduction, he performed subtrochanteric osteotomy.

The operation of Hoffa is applicable only to children under ten years of age. This operation is applicable to all ages, and in patients in whom the deformity increases as age advances. The slipping of the head of the femur backward into the iliac fossa causes a flexion and adduction and extreme lordosis, destroying power and function. It is to overcome the resulting deformity, and especially the lordosis, that he would advise this operation.

The operation is not advisable for all cases, and his purpose is only to recommend it in cases of old luxation having as well considerable lordosis associated with very pronounced adduction.

 THE FILLING OF BONE DEFECTS WITH FOREIGN MATERIAL.

MARTIN (*Centralbl. für Chir.*, 1894, No. 9), in an interesting paper, discusses the results which he obtained in following up the line of research originated by Dreesmann and Mayer.

He showed that in dogs aseptic plaster-of-Paris and base-plate gutta-percha can be used to fill up bone defects, and that the filling will be covered over by either primary or secondary union of the soft parts.

In the first case cited, the wound healed smoothly by primary union over a filling of plaster-of-Paris, and the dog made a complete recovery. In the second case, plaster was also used, but the dog tore away the dressings and opened the wound; some of the plaster escaped, but the wound healed by granulation. The post-mortem examination, made twelve and one-half months after the operation, showed that the plaster had been absorbed and that the bone defect had been completely replaced by new bone tissue.

In the cases in which base-plate gutta-percha was used, primary union followed in the first case, and the post-mortem made five months after operation showed the gutta-percha fast and immovable in the medullary canal, completely surrounded by healthy bone. The second dog showed on post-mortem, eight

and one-half months after operation, the gutta-percha all but surrounded by solid bone, only touching the soft parts in one small point; although the dog had torn away the dressings and opened the wound, it had healed by granulation. There had apparently been partial absorption of gutta-percha, since it had been replaced where it lay outside the medullary canal, by hard bone tissue in both cases. In contrasting it with the plaster-of-Paris, it was noted that it was not so readily absorbed. The use of plaster-of-Paris is perhaps a little easier; it should, however, be reserved for large cavities, the use of gutta-percha being limited by the amount of bone defect. Plaster-of-Paris is more easily removed when it is necessary.

The gutta-percha has the advantage of being both resistant and elastic when it is hardened. It should, therefore, be used where considerable resistance is required, as where the bone-walls are thin; but in cases where considerable strength is required, as solutions of continuity and total loss of bone substance, nothing can be expected from this method, and ivory is to be preferred.

The good restoration of the form of the bone is noteworthy, as shown by the complete covering of the gutta-percha filling by the new bone-growth.

The author believes that it is more necessary, in order to make progress, to find a method that will make bone cavities aseptic, than to find, as some experimenters have tried to do, an antiseptic substance that may be used to fill the cavity in the bone. He does not, however, mean to imply that plaster-of-Paris and gutta-percha are the only substances that are non-irritating and yet suitable for the purpose.

An advance in the antiseptics in bone cavities has been made by Dreesmann, who employed boiling oil. But the practical results of this method are not what they might be, as there is produced a slough which separates the living tissue from the material used to fill the cavity, and this forms a culture medium for bacteria.

The combination of König's skin and periosteum flap transplantations with the above method is productive of better results.

THE LETTSOMIAN LECTURES ON PERITONITIS.

In introducing his course of Lettsomian lectures, MR. FREDERICK TREVES justly comments upon the terrible prominence occupied by peritonitis in our mortality records. This fact, together with the existing diversity of opinion concerning the nature and treatment of this affection, makes the selection at this time a happy one; and, although these cannot be definitely settled at present, a long stride has been taken toward the scientific study of the subject. The originality of thought which is characteristic of the author is very apparent in these lectures (*British Medical Journal*, 1894, Nos. 1727, 1729, and 1732), and he proves himself familiar with the most modern advances in pathology.

At the outset the commonly accepted view of the inflammatory process is rejected. It is shown by illustrative cases and rational deductions that inflammation is a conservative process. The inflammation that surrounds an infected wound or a tuberculous area is a wise provision of Nature to check the invasion of the deadly micro-organisms. It may be assumed, the author

states, that if the process of inflammation was to absolutely disappear from the human body, the race would in a short time become extinct. It is patent, of course, that inflammation may be excessive, that it may fail in its purpose, and that the process frequently needs the controlling influence of surgical or therapeutic measures. What has been thus stated in regard to inflammation applies with equal force in inflammations of the peritoneum.

The most common symptoms in cases of fatal peritonitis are those of poisoning and not of inflammation, and the fatal issue is the result of toxæmia rather than inflammation of the peritoneum.

In the most rapidly fatal cases of peritonitis, post-mortem examination frequently shows the most insignificant changes, while those cases in which there is frank suppuration are often the most favorable.

The pronounced differences in the phenomena which attend inflammations of the peritoneum and of other serous membranes, is dwelt upon at considerable length.

It is pointed out that the peritoneal cavity does not exist in health, but in performing cœliotomy air enters, the organs recede, and a cavity is then manifest. It is suggested that this disturbance of pressure relations must affect the sensitive tissues and thin-walled bloodvessels within the abdomen. This may explain either wholly or in part the remarkable improvement which has frequently followed exploratory cœliotomy. A large number of such cases have been collected by J. William White ("The Curative Effect of Operations *per se*," *Annals of Surgery*, August and September, 1891).

Many other interesting peculiarities of the peritoneum are described, but for want of space must be passed over here.

The etiology of peritonitis has been much simplified by recent bacteriology. It is stated that peritonitis depends almost entirely, if not entirely, upon infective processes, while the existence of non-infective peritonitis is becoming rapidly more and more dubious. Usually the process is that described as continuity infection, by which is meant extension of the disease from some adjacent organ. The following classification is offered as expressing our present knowledge of the subject:

1. Peritonitis due to infection from the intestine.
2. Peritonitis due to infection from without.
3. Peritonitis due to the pneumococcus.
4. Tuberculous peritonitis.
5. Peritonitis of a doubtful nature.

The symptoms of peritonitis are so familiar to every physician that only special features are discussed. Want of space forbids a discussion of these. Two points of especial importance, however, demand notice. One is that vomiting, if persistent, even though slight, is of grave import, and the other refers to the influence of constipation in peritonitis following appendicitis. Mr. Treves' statistics show that the prognosis is better in those cases in which free bowel motions occurred.

To the physician the most important feature is that which refers to the treatment, and this part of the subject has therefore been fully made use of in this review.

Rest should be absolute; the knees may be flexed over a pillow; the chest

and arms should be protected by a woollen jacket, as it is impossible to keep the patient covered on account of the extreme restlessness.

Feeding. The rule should be to give as little nourishment as possible by the mouth. Both absolute prohibition and reckless intemperance in the use of ice and the various liquid substances should be guarded against. Nourishment is to be provided by rectal injections of small quantities of peptonized liquids.

Opium. The advice of the author is distinct upon this point. The rule should be to get along with as little as possible in the acute forms. Morphine, hypodermatically, is absolutely essential, but as a routine treatment it is objectionable. It masks the symptoms, hinders the natural process of cure, and hampers treatment. The indication for its use is actual pain.

Aperients. By aperients is meant those means employed for the purpose of soliciting the action of the bowels, whether this be the administration of drugs or the employment of enemata. The value of aperients in peritonitis is a subject upon which diametrically opposite views are held by the profession. According to Mr. Treves they can never form a part of the routine treatment. In the first place, in many of the most urgent cases they fail entirely to act, and in the event of success it is stated that the treatment would probably not influence favorably the prognosis. The fatal poison is circulating in the patient's system and beyond the reach of purgative measures. The fact that the alimentary tract contains poisonous matter is not overlooked, and to a certain extent aperients may assist in the elimination of this. Some disturbance of the bowel wall is needed, however, to render the poisonous contents of the intestine acutely poisonous and to favor its introduction into the system.

In the conditions, however, which tend to develop peritonitis, the early employment of aperients is frequently of the greatest value. Such are perityphlitis and pseudo-ileus, or the intestinal paralysis sometimes following abdominal operations. The value of an aperient before an operation must have been observed by all surgeons of experience in this line of work. In fully established peritonitis and in the septic form of the disease no benefit can be expected from the use of aperients.

Bloodletting. This measure is recommended particularly in localized peritonitis in a robust person. In perityphlitis the effect of the application of half a dozen leeches is often magical. No good results seem to have followed bleeding in general peritonitis.

Operative measures. These include incision and drainage with or without irrigation. This treatment is separately considered in its application to the two distinct classes of cases of peritonitis. In one there is a well-marked, limited inflammation with pronounced local symptoms, and with the formation of pus, in greater or less amount, the exudation, however, being limited. In the other class the inflammation is diffuse, the constitutional symptoms predominate, the changes in the peritoneum which are apparent are slight, and bear no relation to the overwhelming character of the general disturbance. Cases coming under the first class are such as those complicating appendicitis, the various forms of pelvic peritonitis, and the subphrenic inflammation, and those cases following injury or perforation that remain localized. The second form includes the general peritonitis following perforation, strangu-

lated hernia, puerperal peritonitis, and the cases of genuine inflammation following upon abdominal operations.

In the first series, operation is comparable to the evacuation of a large abscess, while incision and irrigation in the second class has in view the same object as washing out of the stomach after an active poison has been ingested. Of the operative treatment of suppurative peritonitis, especially if localized, the past records show scores of successes. Modern surgery, the author tells us, can only lay claim to greater boldness, increased frequency of operation and less delay. Doubt is expressed, on the other hand, if a single life has been saved by operation in a case of general peritoneal toxæmia, exception being made of course of tuberculous peritonitis.

Regarding operations the following are among the suggestions offered: The usual measures for securing surgical cleanliness. In localized purulent peritonitis the incision should be made by the most direct route. After the pus has been evacuated a fenestrated rubber tube is introduced and an absorbing dressing applied. Squeezing or curetting of the cavity is objected to as being productive of no good, while harm may follow. After twenty-four or thirty-six hours diurnal irrigations should be employed. In generalized serous peritonitis, after incision the peritoneum may be dried and the wound closed. If the exudation is sero-purulent, or purulent, the cavity is to be irrigated with 0.6 per cent. sterile salt solution at the temperature of the body. After drying the cavity as before, exposed portions may be dusted (excepting children) with iodoform. In tuberculous peritonitis the best results are said to follow simple incision, without either irrigation or drainage. In the cases of plastic peritonitis, which is apt to accompany perforations, the greatest gentleness of manipulation is necessary, lest the perforation be reopened in case it had become closed with lymph. In these cases irrigation and drainage will usually be unnecessary.

In order to avoid peritonitis after abdominal operations, it is essential that the operating-room, the instruments, and utensils, and the surgeon and his assistants, be absolutely clean; this end, it is stated, can be attained without the use of chemicals by the vigorous use of soap, water, and brush. Ligatures and sutures are by preference kept in an ethereal solution of corrosive sublimate, being dipped in sterilized water just before use. Instruments are placed in 1:20 carbolic solution for fifteen minutes; before being used the liquid is diluted with sterilized water until the strength is 1:80 or 1:100. Gauze sponges answer very well; they may be sterilized in 1:20 carbolic solution, which is to be largely diluted before they are used for reaching the depths of the cavity; ordinary sponges prepared in the same manner and fastened to holders, are the most suitable. It is important, of course, to do the least possible violence to the peritoneum. After having tried every method of closing the abdominal wound, the author recommends a continuous suture of fine silk in the peritoneum, and interrupted silkworm-gut sutures embracing the entire thickness of the abdominal wall except the serous membrane. The peritoneal sac should be left as dry and clear as possible, bleeding should be carefully arrested, and all clots, pus, cyst fluid, and the like, should, when practicable, be removed; but care must be observed that these are not obtained at the cost of undue violence to the peritoneum. For the removal of blood-clots and localized collections, the sponge is to be preferred to irrigation. If,

however, it is necessary to cleanse the general cavity, the 0.6 per cent. salt solution at blood-heat should be employed. Drainage will be necessary if a noxious material is left in the peritoneal cavity, or if it is expected that an extensive effusion will follow. Objection is made to the glass drainage-tube on account of its rigidity. The fenestrated rubber tube meets all indications, and is free from this objection; occasionally the use of strips of iodoform gauze will best secure the necessary drainage.

In conclusion, the author remarks that the surgeon's position with regard to peritonitis is, at the present time, similar to that which obtained some thirty years ago in regard to external inflammations. His efforts are directed against the effects of damage already done, rather than toward measures of prevention.

OBSTETRICS.

UNDER THE CHARGE OF

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TWO CÆSAREAN SECTIONS FOR CICATRICAL STENOSIS OF THE SOFT PARTS.

KAYSER (*Zeitschrift für Geburtshülfe und Gynäkologie*, Band xxvii., Heft 2) reports in detail the histories of two cases operated on at the University Frauenklinik at Giessen. The first patient was twenty-nine years old and at the end of her second pregnancy. In her first labor the child had apparently been extracted by forceps after cephalotripsy had been performed, and six weeks later the patient had been operated on for vesico-vaginal fistula by Prof. Löhlein, with favorable result. On vaginal examination it was found that the vagina was narrowed, and stretching from the cervix backward and on all sides were strong bands of cicatricial tissue. On the anterior vaginal wall the cicatrix of the old operation for vesico-vaginal fistula existed as a hard swelling. A true portio was not present, but in place of it there existed only a flat projection, in which, high up toward the promontory, the external os uteri existed as a small shallow cavity. A double promontory with some sacral lordosis were present. Induction of labor by means of hot and cold vaginal douches, tampons, etc., was tried without success, the cervix being only capable of a small amount of dilatation, owing to the existing cicatricial tissue. As the patient earnestly desired a living child, and it was feared that deep cervical incision might lead to unfavorable results for mother

and fœtus, the Cæsarean operation was decided on and performed on the fifth day after the patient's admission, the child being safely delivered. No unfavorable symptoms occurred to the mother except slight secondary hemorrhage from the vagina, which was easily controlled by an ice-bladder and ergot. Both mother and child left the hospital in good condition, though in the former the old scar tissue still remained and no portio could be felt.

The second case was a II-gravida, who gave a history of having been delivered of a dead child by forceps after a labor of three days. From this a vesico-vaginal fistula developed. The vaginal entrance, the canal itself, and in particular the inferior portion of the recto-vaginal septum were very much narrowed by cicatricial tissue. A urethro-vaginal fistula also existed. Both fistulæ were closed by operation, but the vagina remained in a state of incomplete atresia. The patient's pelvic measurements were as follows: Sp., 22.3; Cr., 25.5; Tr., 29; Conj. ext., 18.5. In the hope of helping dilatation of the soft parts and of exciting uterine contractions, warm vaginal injections of carbolic acid solution and tampons were tried without success. As it seemed impossible to bring a living child through the unyielding cervix and vagina, it was decided to do Cæsarean section. Considerable hemorrhage was encountered during the operation, but was successfully controlled. The child weighed 1850 gms., and was living. The mother, after a somewhat variable puerperal period, died in coma on the eighth day, and at the autopsy the following conditions were found: Fatty degeneration of the heart with anæmia of all the organs. Spleen enlarged, and in the gall-bladder, which was considerably enlarged, were found many gall-stones. In pieces of the uterine tissue subjected to bacteriological examination there were found in the endometrium strepto- and staphylococci with other bacteria, while in the muscular tissue only small oval forms were present. A guinea-pig inoculated from the endometrium died in twenty-four to thirty-six hours, whilst another into which a solution of the muscular tissue was injected remained healthy. The child of the second patient died of icterus.

SIX CASES OF BRIGHT'S DISEASE IN PREGNANCY AND LABOR.

HERMAN, at a meeting of the Obstetrical Society of London (*Lancet*, January 13, 1894), presented the histories of six cases of Bright's disease occurring during pregnancy and labor. From the comparisons of the histories of the above and others published in the Society's *Transactions*, he concludes that there are at least two kinds of renal disease to which a pregnant woman is especially liable. One of these is a very acute disease in which premonitory symptoms are either absent or of duration measurable by hours or days. It attacks chiefly primigravidaë and often causes intra-uterine death of the child. The above form of the disease is also attended with extreme diminution of the quantity of urine; the small amount that is passed being greatly deficient in urea, but containing enough albumin to make it solid on boiling. This form of disease is accompanied with rapidly occurring fits; but if it runs a favorable course, the fits cease and the urine increases in amount, the percentage of urea rising therein. If the excretion of urea is not re-established the case quickly ends fatally. Such cases seldom, if ever, pass into chronic Bright's disease. The other is a disease which attacks older subjects, chiefly

those who have previously had children. Its premonitory symptoms extend over a period of weeks or months, and often lead to the intra-uterine death of the fœtus. This form of the disease is generally accompanied by increase in the quantity of urine, with copious loss of albumin, but not so much in proportion to the urine as in the more acute disease, and with diminution in the elimination of urea, but not to such a degree as in the more acute form. Delivery is followed by temporarily increased diuresis and increase in urea elimination. This form may, the elimination of urea continuing low, pass into chronic Bright's disease.

The presence of albuminuric retinitis affects the prognosis unfavorably. When the pressure within the abdomen is greater than usual, the amount of urine may be diminished, but in such cases the diuresis and augmentation of the urea elimination after delivery are proportionately greater. In the acute disease, which causes eclampsia, and in the chronic disease when it is associated with excessive intra-abdominal pressure, much of the albumin is paraglobulin. The cases in which the albumin is mainly serum-albumin generally either die or pass into chronic Bright's disease.

The paper was discussed by members present, and a few cases bearing on the above were cited.

THE NATURE AND TREATMENT OF ASPHYXIA NEONATORUM.

MORRISON (*Lancet*, 1894, No. 3678), while admitting the essential cause of asphyxia neonatorum to be interference with placental circulation, prefers to group this disorder with diseases of the circulation, instead of classing it among disorders of the respiratory organs as some authors do. The causes of asphyxia and its relation to atelectasis are dwelt on, and the importance of the use of the stethoscope as a means of learning the condition of the fœtal circulation during birth is emphasized. The physiology of the placenta and fœtal circulation are explained; special attention being called to the anatomical peculiarities of the umbilical cord. In the average cord, the most notable feature is the special arrangement of the bloodvessels; the arteries becoming wider as they approach the placenta, and this, according to Galabin, is for the purpose of diminishing the circulation toward the placental end of those vessels. The author believes that in addition to this function, this arrangement has an influence in producing the cardiac retardation noted in the fœtus when the uterus contracts. Associated with this, the spiral course taken by the umbilical vessels must be regarded as erecting a barrier against excessive afflux and reflux of blood either toward the placenta or fœtus.

The evidence of threatened fœtal death is the disordered action of the heart. The dying adult heart usually quickens, and may even assume the "tic-tac rhythm" of fœtal life. The expiring fœtal heart, on the other hand, becomes progressively slower until it ceases to beat, and therefore a decreased frequency in the number of the child's heart-beats (except during uterine contractions), and not acceleration, usually portends danger. Such changes in the child's circulation may be detected by auscultation with the stethoscope, and are only liable to one fallacy—the temporary loss or lessened audibility of the fœtal heart from change of position on the part of the fœtus; if, however, lessened audibility be associated with normal accelera-

tion, this sign may be regarded as due to distance of the heart from the surface of the abdomen, rather than to diminished vitality of the fœtus. When, in addition to the changes before noted, attempts either at abdominal or thoracic respiration are made by the fœtus during obstetric manipulation, the danger to its life is imminent. When sufficient air is in the uterine cavity, the recurrence of the intra-uterine fœtal respiration may be denoted by a fœtal "cry"—*vagitus uterinus*; and the author believes that on more than one occasion he has heard the fœtal cry before the delivery of the head in the case of multiparæ, in whom the infra-uterine section of the birthway has been fully dilated—a *vagitus vaginalis*.

SYMPHYSIOTOMY WITHOUT BONE SUTURES.

BENSINGER (*Centralblatt für Gynäkologie*, 1894, No. 7) reports a case of symphysiotomy in a multipara with a generally contracted pelvis. After incising the bone, leaving the ligamentum arcuatum untouched, the bones separated two centimetres. The forceps was then applied, and a living female child extracted. During the delivery the ligamentum arcuatum was broken, and the bones separated six centimetres. A small tear and some hemorrhage resulted. The writer makes the case a text for discussing the objections to bone sutures. Catgut he regards as insecure and too quickly absorbed; wire will contuse or crush the porous bone tissue of the symphysis; but the greatest objection to suture into the bone is, that in symphysiotomy the wound must be drained. Experience shows that bone sutures, if not in absolutely closed wounds, invariably suppurate. In his case, after careful suturing of the fascia and soft parts with five silk button stitches, and drainage through the lower angle of the wound with iodoform gauze, a firm bandage and fixation band were put on. The fixation bandage is made of firm elastic webbing, 25 cm. broad, edged with drilling and furnished with buckles. It is well wadded to prevent fouling. It may be covered with gutta-percha paper. The wound healed by first intention, and on the fourteenth day the patient left her bed. No tenderness was found over the pubes, and at the point of section firm cartilaginous union 1 cm. broad can be felt. The woman walks with perfect ease.

IS FRACTURE OF THE CLAVICLE A CONTRA-INDICATION FOR SWINGING A DEEPLY ASPHYXIATED CHILD?

SCHULTZE (*Centralblatt für Gynäkologie*, 1894, No. 8) reports a case in which a lightly asphyxiated child, after being restored by swinging, suddenly died, and a post-mortem revealed fracture of the inner third of the right clavicle. The broken bone had entered the first intercostal space, perforating the pleura costalis and lung. Pneumothorax and emphysema of the anterior and posterior mediastinal spaces, of the deep tissues of the neck and right chest were found.

Heydrich counsels against swinging in cases of fractured clavicle, and the writer agrees with him in the main, but asserts that swinging can be practised with perfect safety, even if the bone is broken; care being taken to secure the broken ends in such a manner as to preclude their being driven into the lung or pleura.

During the inspiration swing, the child should rest with its whole weight on the index fingers, which are in the axilla. In the expiratory position the infant should rest on the thumbs held before, and the four fingers which are loosely placed in the axilla and on the back. In no phase of the swinging is it correct to push the clavicles backward.

ALUMNOL, A NEW ANTISEPTIC.

HEINZE and LIEBRECHT (*Centralblatt für Gynäkologie*, 1894, No. 8) state that alumnol is an aluminium salt of the naphthol sulphur acids. It is a fine, white, non-hygroscopic powder, easily soluble in cold water. The authors believe it capable of deep as well as superficial astringent action. It has been tested in surgical, gynecological, and dermatological cases. In gynecological work, in the treatment of cavity wounds, after abdominal operations, etc., it is useful in solutions of 0.5 to 1 per cent. It is also useful especially in endometritis of gonorrhœal origin, as it attacks the gonococci deep in the tissues. Finally it is useful in colpitis, non-gonorrhœal in character, the strength being the same as given above.

ALUMNOL IN GONORRHŒA.

CASPAR and SANDER (*Centralblatt für Gynäkologie*, 1894, No. 8) do not consider alumnol by any means a specific for gonorrhœa. In acute cases it is no better than those agents hitherto used, and in chronic cases they consider it inferior to nitrate of silver.

GONORRHŒAL AFFECTIONS IN THE MOUTHS OF NEWBORN INFANTS.

LEYDEN (*Centralblatt für Gynäkologie*, 1894, No. 8) narrates a case of gonorrhœal affection of the mouth in a newborn child.

The mother of the child, an unmarried woman, presented herself when already in labor, having a vaginal discharge of a month's duration. The discharge was treated by daily washing out the vagina with lysol solution, and after applications for ten days the discharge ceased. The child when born was delicate and imperfectly developed. As soon as the head was born, both eyes were thoroughly washed with a solution of bichloride 1:7000. On the morning of the seventh day the right eye became inflamed, and the following night a yellowish pustule appeared on the inner surface of the upper lip. Abundant gonococci were found in the discharge. Later the left eye also became involved. After a few days the eyes and sore mouth gradually improved under a treatment of washes composed of bichloride solution 1:7000. In explanation of the infection of the mouth, it is quite possible that the child with its own hands conveyed the virus from the eyes during the incessant movements so common in young children.

A CASE OF MELÆNA NEONATORUM.

SHÜTZE (*Centralblatt für Gynäkologie*, 1894, No. 9) reports the case of a male child born of a healthy mother after a normal labor. The skull was found somewhat drawn after birth, and a tumor formed on the posterior part. During birth the cord was wrapped around the child's neck.

Three days after birth intestinal hemorrhage appeared, accompanied by loss of weight and symptoms of anæmia. The autopsy showed the stomach distended with gas, and containing a teaspoonful of liquid blood. The gastric mucous membrane was intact. The duodenum, jejunum, and upper half of the ileum were free from blood, but in the lower small intestine and colon were found fluid and clotted blood, although there was no break in the mucous lining. Under the tentorium cerebelli on both sides small effusions of blood were found resting on the dura and somewhat infiltrating the tissue.

MYOMECTOMY DURING PREGNANCY.

STAVELY (*Johns Hopkins Hospital Bulletin*, 1894, No. 38) states that myoma complicating pregnancy is rather uncommon, on account of the tendency of this growth to cause sterility, or, in the event of pregnancy, early abortion. Virchow and Scanzoni state that fully 50 per cent. of women bearing myomata are sterile. If pregnancy occurs, notwithstanding the existence of this growth, the necessity for surgical interference must be considered, and depends upon the individual peculiarities of each case. Thus, a small myoma may not complicate the course of pregnancy or interfere with labor, no matter where situated. An interstitial myoma of the upper zone of the uterus, even though of considerable size, usually offers no mechanical obstruction to labor, and, unless symptoms arise which render an operation necessary, should not be touched. Tumors which are situated in the early months of pregnancy in the lower part of the uterus may gradually ascend from the pelvis and occupy such a position at term that labor is in no way complicated.

A pedunculated myoma blocking the pelvis and causing severe pressure symptoms may frequently be freed from its confined position by careful manipulation, and this may be accomplished more readily by placing the patient in the knee-chest position. Manipulation may either fail on account of the cramped environment of the tumor, or on account of the adhesions which bind it so firmly in the pelvis that attempts at separation may be attended by disastrous consequences, as the cases cited by Phillips and Handfield-Jones prove.

The dangers from surgical operation in these cases are shock, abortion, hemorrhage, intestinal obstruction, and infection. On the contrary, in non-interference, abortion, hemorrhage, sepsis, rupture of the uterus, pressure symptoms, intestinal obstruction, and mechanical obstruction to labor may occur.

The author draws the following conclusions from an analysis of the cases operated on: (1) Operations performed during the last eight years have been attended with much better results than in former years; (2) operations upon sessile myomata are more disastrous to the fetus than are those of pedunculated tumors; and (3) myomectomy, for pedunculated or sessile myomata, is comparatively safe and thoroughly justifiable in properly selected cases.

CENTRAL LESIONS AT BIRTH A CAUSE OF MELÆNA NEONATORUM.

PREUSCHEN (*Centralblatt für Gynäkologie*, 1894, No. 9) contributes an outline of his researches relative to the relation of lesions of the central organs

occurring during birth to melæna neonatorum. In repeated post-mortem examinations he had observed erosions of the gastric mucous membrane; hemorrhagic infarctions of the lungs, and at the same time tolerably extensive blood extravasations were present under the tentorium, on the cerebellum, crura cerebelli, ala cinerea or corpora quadrigemina, and once on the surface of the cerebral hemispheres. He was thus induced to make observations on rabbits. A solution of chromic acid was injected into portions of the brain to be examined, and thereby were obtained lesions accompanied by melæna. The infarctions in the lungs and stomach were not always associated. The gastric extravasations were sometimes the size of a pin's head, and although generally scattered, were mostly in the cardiac region, fundus, and great curvature, but were seldom found in the antrum pylori. In other cases the extravasations followed the vessels. Occasionally there were large, isolated extravasations, 1 to 2 cm. long and broad. In other experiments, pieces of sponges and laminaria were placed in various parts of the brain, and paraffin was injected between the brain surface and calvarium. The same results as in the former experiments followed in the stomach and lungs.

The literature of melæna gives 92 cases, with 51 deaths and 46 autopsies. Leaving out the older cases, to the third decennium of this century, 37 cases remain; of these only five give evidence of careful and complete examinations on the brain. In 31 the associated lesions were found.

GYNECOLOGY.

UNDER THE CHARGE OF

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THE PEDICLE IN HYSTERO-MYOMECTOMY.

MARTIN (*Centralblatt für Gynäkologie*, 1894, No. 16) in a discussion of this subject before the International Medical Congress, concludes his remarks with the opinion that total extirpation is the ideal operation, since it is fair to infer that the dangers to be feared from the operation are derived from the stump.

MANGIAGALLI thought that the influence of the stump upon the mortality of hysterectomy had been exaggerated, since the situation of the tumor (whether intra-ligamentous or not) has as much, or more, to do with the prognosis after operation. Zweifel's method, with the use of the elastic ligature, is the simplest and most rapid. The extra-peritoneal method is rarely indicated.

JACOBS believed that total extirpation is the ideal method, since it saves loss of blood, and consequently shock, especially if clamps are used. His plan is to secure the uterine arteries *per vaginam*, then to open the abdomen, to clamp the broad ligaments, and to remove the tumor, draining with gauze.

PEAN believed that as soon as a fibroid of the corpus uteri of considerable size is recognized, it should be removed by cœliotomy without regard to its site, either by the use of the elastic ligature, forcipressure, or by morcellation; if of moderate size, the growth should be removed piecemeal *per vaginam*, with the uterus, the broad ligaments being secured with forceps.

LANDAU laid down the following rules: If the tumor is below the umbilicus, extirpate it piecemeal *per vaginam*; if larger, enucleate it as rapidly as possible, and remove the stump *per vaginam*; it is better not to close the peritoneal cavity, hence the advantage in using clamps.

CARLE, of Turin, affirmed that myomotomy is only indicated in cases in which the symptoms are urgent, such as profuse hemorrhages, persistent pain, and pressure effects. He reported one hundred and fourteen cases in which all the different methods were employed, with seven deaths, among which total abdominal extirpation was performed twenty times, vaginal hysterectomy eleven, and morcellation eleven with no mortality.

THE TREATMENT OF COMPLICATED PELVIC ABSCESS.

LANDAU (*Ibid*) summarizes his conclusions on this subject as follows: In all cases in which pyosalpinx is complicated with intra- and extra-peritoneal abscesses (with or without intestinal or vesical fistulæ), where extirpation by the vagina or by cœliotomy is impossible or too dangerous, the uterus and diseased adnexa can be safely removed through the vagina by means of clamps. If suppurating tubes and ovaries cannot be completely removed *per vaginam*, it is not proper to be content with the extirpation of the uterus alone, but cœliotomy should be performed. In uncomplicated cases of double pyosalpinx the uterus should be removed *per vaginam* with the tubes. Before proceeding with the radical operation, however, the fact of the existence of bilateral disease should be positively determined by an explorative incision, either vaginal or abdominal. If possible, a conservative vaginal operation should be done, adhesions around the adnexa being separated through an incision in the posterior fornix.

JACOBS, in discussing this subject, reported one hundred and eighty-four cases operated upon by the vaginal method, with only five deaths.

LEOPOLD stated that he was accustomed to perform cœliotomy in uncomplicated cases, but in cases complicated with fistulæ, where the patient had been bedridden for years, or where experience had shown that the uterus, if allowed to remain, would cause persistent trouble, he was accustomed to remove the organ with the adnexa *per vaginam*, using ligatures instead of forcipressure. He reported thirty cases, with only one death.

COMPLETE PROCIDENTIA IN THE NULLIPARA.

SCHRAMM (*Centralblatt für Gynäkologie*, 1894, No. 15), refers to the rare occurrence of this displacement in women who have not borne children, and especially in young girls, in whom it is nearly always of traumatic origin. He reports the case of a strong, muscular servant, aged seventeen, who had complete procidentia from unknown causes, with marked hypertrophy of the cervix. The cervix was amputated, and anterior and posterior colporrhaphy were performed, in addition to which it was necessary to excise a wedge-

shaped piece from the anterior aspect of the corpus uteri. The patient was discharged at the end of a month, with the uterus in normal position. From the history it was inferred that venereal excess, as well as severe manual labor, had been an active etiological factor.

[It is a question if shortening of the round ligaments, preceded by amputation of the cervix, would not give a more permanent result in such cases.—Ed.]

THE CONSERVATIVE TREATMENT OF PYOSALPINX.

VUILLET (*Ibid.*) in opening the discussion on this subject, arrived at the following conclusions: In the majority of the cases a cure can be effected by puncture of the tube alone, or followed by incision and drainage, and is devoid of danger in skilled hands. He had had two cases of pregnancy in pyosalpinx thus treated, and therefore believed that it was the duty of gynecologists to adopt this conservative method before deciding to remove the adnexa.

POZZI affirmed that puncture was not curative in suppurative disease of the tubes; he favored the preservation of portions of diseased ovaries in order to render subsequent conception possible.

MARTIN agreed with the latter with regard to resection of the ovary, but favored also resection of the tubes. He stated that about one-fourth (!) of the patients whose diseased ovaries he had treated conservatively had subsequently become pregnant.

VAGINAL HYSTERECTOMY FOR DISEASE OF THE ADNEXA.

JACOBS (*Centralblatt für Gynäkologie*, 1894, No. 18) strongly urges the superiority of the vaginal over the abdominal operation for the removal of diseased adnexa, presenting his own statistics, showing a mortality of 2.7 per cent. in 184 cases, as compared with a death-rate of 5.7 per cent. in 1540 cœliotomies performed by various operators, including Martin and Tait. In 690 vaginal salpingo-oöphorectomies by other operators, including himself, the mortality was only 4.49 per cent. Moreover, it was formerly the practice to resort to the vaginal operation only in complicated cases in which cœliotomy was judged to be impossible—an additional argument to support his position that where removal of both tubes and ovaries is indicated the uterus should be removed at the same time. He denies the justice of the criticism that after the vaginal operation has once been begun it must be completed, since it is his practice to first open Douglas' pouch and to satisfy himself regarding the condition of the adnexa. If both are diseased, he removes them with the uterus, otherwise he performs unilateral salpingo-oöphorectomy.

ENCAPSULATION IN ABDOMINAL DRAINAGE.

FRANK (*Centralblatt für Gynäkologie*, 1894, No. 16) insists that subsequent observations have confirmed the opinion which he expressed in 1881, that drainage after cœliotomy is dangerous unless the diseased portion of the abdominal cavity can be completely shut off from the healthy. It is easy thus to isolate the pelvic cavity by utilizing the existing natural barriers, the

rectum with the meso-rectum and meso-colon, which can be drawn down over the raw surface. This barrier is fortified by the union of the appendices epiploicæ of the gut with the parietal peritoneum. In this way the coils of small intestine are prevented from coming in contact with the raw surfaces.

[The writer apparently overlooks those cases in which, on account of general adhesions, it is impossible to draw down the protecting barrier.—ED.]

THE SURGICAL TREATMENT OF INCONTINENCE OF URINE.

FRANK (*Centralblatt für Gynäkologie*, 1894, No. 16) describes the following successful operation for incontinence following parturition, presumably due to retroflexion with fixation: The anterior vaginal wall was incised from a point just opposite the beginning of the urethra, as high as the portio, and the posterior wall of the bladder was dissected away. A fold was turned into the bladder, so as to form a valve over the vesical opening, and was secured with catgut sutures. A cicatricial band, which extended across the vesico-uterine pouch, had previously been divided, and in order to prevent its re-formation a vaginal flap was brought over and sutured in its place. After the third day the patient was able to pass her urine naturally, and the incontinence was permanently relieved.

SCHULTZE (*Centralblatt für Gynäkologie*, No. 17) read a paper on "Urethral Incontinence" before the International Medical Congress, in which he advocated the following operation that he had performed successfully: In a patient with incontinence due to laceration and fistula of the urethra, he made a denudation in the shape of a horseshoe, including the fistula and extending as high as the neck of the bladder, uniting the apposed surface with numerous sutures of silkworm-gut. A catheter was left in the bladder for nine days, at the end of which time the sutures were removed, and there was perfect retentive power. The bladder being much contracted, its capacity was increased by hydrostatic pressure from four to six ounces.

THE RESULTS OF THURE BRANDT'S METHOD.

JENTZER (*Ibid.*) reports 114 cases, including various pelvic affections, from a review of which he deduces the following conclusions with regard to treatment during menstruation: If pelvic massage is practised during the menstrual flow it must be gentle and the sittings must be of very short duration, the movements being those which oppose congestion. At this time it often relieves pain, and, if carefully conducted, never causes inflammation. Metrorrhagia is relieved, pelvic exudates are more rapidly absorbed, and adhesions disappear more easily and rapidly. In general, if massage is suspended during the menstrual flow, the treatment must be much more prolonged.

SALPINGITIS NODOSA.

UNDER this name WERTHEIM (*Centralblatt für Gynäkologie*, 1894, No. 18) refers to the form of tubal hypertrophy described by Schauta and Chiari as the incipient stage of chronic salpingitis. The nodules were previously supposed to be true myomata of the tubes. They are always located near the uterine end, and are accompanied by evidences of perimetritis. In the

writer's case several nodules as large as walnuts were situated near both uterine cornua. The distal ends of the tubes were occluded and their ampullæ were filled with pus. On section the nodules were found to be small abscess cavities communicating with the uterus by minute openings, but having no connection with the lumen of the tube. It seemed as if the nodules had been formed by the shutting off of crypts in the mucosa and by subsequent purulent change in their originally clear serous contents. Through the coalescence of several adjacent follicles a large pus cavity would thus be formed.

OPERATION FOR ECTROPION OF THE BLADDER.

REIN (*Centralblatt für Gynäkologie*, 1894, No. 17) describes an ingenious operation which he performed successfully for this condition. With the patient in Trendelenburg's posture, he first made a long abdominal incision, pushed the uterus and left tube and ovary aside, and introduced a sound into the left ureter. Another sound was inserted into the rectum and the tips of the two instruments were approximated. An incision was made in the ureter at a point opposite to the tip of the sound, and also in the rectum. A glass tube was inserted into the ureter, and to it was attached a piece of rubber tubing, the other end of which was carried through the rectal opening. The corresponding openings in the ureter and rectum were then united by two layers of silk sutures. The same procedure was adopted on the right side. The bladder was then extirpated *in toto*, after which the patient was lowered to the dorsal posture and the vesical arteries and their branches were ligated and the abdominal wound was closed. The operation lasted three hours.

SURGERY OF THE URETERS.

SCHAUTA (*Centralblatt für Gynäkologie*, 1894, No. 17) reports the following case of nephrectomy for uretero-vaginal fistula: The patient, aged seventy-one years, had carcinoma, involving the cervix and nearly one-half of the posterior vaginal wall, the uterus being fixed by parametric exudates, which were not thought to be malignant. On account of the extent of the disease the sacral operation was performed, the patient making a good recovery, but she was discharged with a uretero-vaginal fistula. She was readmitted, and it having been determined, by endoscopy and catheterization, that the left kidney was normal, and that the fistula could not be located in the cicatricial tissue at the site of the former wound, it was decided to extirpate the left kidney, which was done successfully, the patient being discharged well on the eighteenth day. Microscopical examination of the specimen showed limited foci of fatty degeneration in the cortex, with round-cell infiltration and localized desquamation of the tubal epithelium.

PENROSE (*Kansas City Medical Index*, 1894, No. 5), in performing abdominal hysterectomy for carcinoma of the uterus, with an extensive infiltration in the left broad ligament, was obliged to excise an inch of the left ureter in order to remove all the diseased tissue. After removing the uterus and suturing the peritoneum over the vaginal opening, he ligated the distal end of the ureter and implanted the proximal end in the bladder according to Van Hook's method. The abdomen was closed without drainage, and the

patient made an uninterrupted recovery, passing thirty-eight ounces of urine on the fourth day, and being discharged on the twentieth. A similar case has been reported by Kelly.

[Comparing these two cases, it would seem as if the plan adopted in the latter was by far the more rational and scientific. The recovery of such an aged patient after extirpation of the kidney must be regarded as decidedly exceptional, and in no respect justifies the performance of such a radical operation, especially as the kidney seems to have been only slightly diseased.—Ed.]

HISTOGENESIS OF ENDOMETRITIS.

AMANN, JR. (*Ibid.*), from a study of tissue removed with the curette, is disposed to believe that the condition usually described as chronic endometritis partakes more of the character of a neoplastic than of an inflammatory formation. In so-called "interstitial" endometritis he found marked karyokinesis of the cells of the mucosa and of the endothelium of the smaller bloodvessels, with only a small amount of chromatism. The extensive proliferation of the cells lining the capillaries causes a certain friability of the vessel walls, which explains the tendency of hemorrhage. The surface epithelium in the so-called "glandular" form of endometritis shows little, if any, tendency to proliferate. In another variety of the condition the proliferation seems to be almost entirely confined to the superficial epithelia, though it may affect the deeper layers and lead to the gradual formation of squamous epithelium (*psoriasis uterina*). Leucocytes were found undergoing segmentation, not only in the lymph- and bloodvessels, but in the mucosa. The writer concludes that the general disposition of the cells to karyokinesis and their poverty in chromatin in chronic endometritis is by no means an evidence of malignant degeneration, as might at first sight be inferred.

PÆDIATRICS.

UNDER THE CHARGE OF

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ŒDEMA NEONATORUM.

SEMET (*Thèse de Paris*, 1893; *Revue des Mal. de l'Enfance*, April, 1894, p. 214) states that œdema neonatorum is still often confounded with sclerema—an unfortunate error, because the latter disease is almost always fatal, while the former, though grave, is susceptible of cure. Œdema neonatorum

appears especially in feeble or premature children, when subjected to bad hygienic conditions and exposure to cold, and its chief causes appear to be feebleness of the right heart and weakness of the respiratory muscles. Thoracic aspiration is thus diminished, and hence follows engorgement of the cardiac chambers, of the vessels, and especially of the veins. Œdema usually begins in the first three or four days of life, though it may not appear for several weeks or even months. In all cases before the appearance of œdema, the infant refuses the breast and cries incessantly.

Most frequently the œdema appears first in the lower extremities and gradually extends upward, involving the face and back last; generalized œdema is, however, very rare. Occasionally the arms and face are the first parts affected. The skin, which at first was pale, now becomes red or even violaceous; upon the face and extremities it is cyanosed. At the same time the surface becomes firmer to the touch, and pitting, which at first was easily produced, becomes more difficult to bring out as the infiltration increases; and now movement of the limbs may be impeded, but immobilization of the joints and rigidity of the body, as seen in sclerema, are never observed.

The skin is cold and the thermometer registers a very low temperature, 93° to 95° F. In some cases extraordinary temperatures have been noted: Henning has observed 71.6°, and Letourneau mentions 68° F. A. Robin states that the axillary temperature is always equal to the rectal, if not higher than it.

Unless the œdema affects a wide area recovery may result after four or five days or more. Henning has seen it after seventeen days. The treatment consists in improved hygienic conditions, a tonic regimen, and warmth to the surface. Pulmonary and gastro-intestinal complications, which are frequent, are most to be feared.

In sclerema also there is feebleness; small pulse, sometimes scarcely perceptible; low temperature, and in some cases alteration in the elasticity of the skin; but here the back and shoulders are first affected, and the legs last, while the skin is hard and cannot be pinched up, nor does it pit on pressure. Sclerema rapidly progresses, and the hardening of the skin produces absolute immobility resembling cadaveric rigidity. The lips and face may be so affected that nursing is impossible, and thus the prognosis is very grave and the course of the disease very rapid.

CYSTITIS DUE TO THE COLON BACILLUS IN THE COURSE OF VULVO-VAGINITIS IN A CHILD.

HAUSHALTER (*Revue Médicale de l'Est*, 1894, No. 6, p. 171) relates the history of a girl of six years, in whom, during the course of an intense vulvo-vaginitis with abundant yellowish-white discharge, symptoms of severe cystitis appeared. Micturition was frequent and painful, and slight tenderness was elicited by pressure over the hypogastrium. The urethra appeared healthy and no pus could be expressed from it. The urine was normal in quantity, contained no albumin or casts, but deposited a thick layer of pus. Bacteriological examination of urine collected so as to avoid external contamination showed the bacillus coli communis. Under a milk diet, rest in bed, and salol administered internally, amelioration was rapid and the cure complete in three weeks.

THE TENACITY OF DIPHTHERITIC VIRUS.

BELFONTI (*Riforma Med.*, March 23, 1894; *British Med. Journal*, May 5, 1894) records a fatal case of diphtheria in a child, in which cultivation of the membrane showed the presence of Loeffler's bacillus and a streptococcus. The interest in the case lies in the fact that the infection seems to have been traced to a brother who had survived an attack of the disease seven months before. After the fatal termination of the second case, an examination of the pharynx of the other child revealed a chronic follicular tonsillitis, with chronic indolent enlargement of the cervical glands. Exudation from the tonsil showed the presence of the same microbes as were found in the fatal case, and extremely virulent cultures of the Loeffler bacillus were obtained. A second examination, three months later, showed that the bacillus was still present, but in a state of great attenuation, giving rise only to slight local inflammation when inoculated into susceptible animals. In the case of the surviving child, immunity had, of course, been secured by his attack; but for seven months after his illness he continued to carry in his throat and its secretions a germ of extreme virulence, which had brought about the death of his sister after that interval, and still continued to be a menace to others, in decreasing degree, for several months longer. The importance of rigid disinfection and even bacteriological examination of the secretions of the throat, before a patient is allowed to mix with healthy people, is pertinently emphasized by this interesting observation.

A DIASTOLIC BRUIT AT THE APEX IN THE HEART DISEASE OF CHILDREN.

THEODORE FISHER (*British Medical Journal*, April 28, 1894, p. 906) calls attention to a diastolic or sometimes presystolic sound not infrequently heard at the apex in association with a dilated heart. Donkin, in his *Diseases of Children*, notes a well-marked example in a child of eight years, "where a loud and long diastolic murmur, as well as a systolic, was always heard at the apex, but the necropsy showed a mitral orifice of fully three inches round, and no lesion other than a few small granulations on the auricular surface."

Fisher refers to the post-mortem records of thirteen cases of adherent pericardium in children who died in Guy's Hospital during a period of seven years, and in the clinical histories of five of these a diastolic or presystolic bruit had been present at the apex, yet the necropsy showed that the mitral orifice was dilated and the aortic valves were not thickened. Whatever explanation may be brought to explain this sound, the author observes, the fact remains that the bruit did not point to stenosis of the mitral valve. In three of these cases, as in another case under the care of Dr. Wheaton, in the Royal Hospital for Children and Women, a systolic thrill was noted—another confusing element if the heart was beating so rapidly that the exact time of its occurrence could not always be easily ascertained. Cheadle has noticed the frequency of a diastolic sound in the early endocarditis of children, and states that, although it may disappear, it generally develops into the presystolic bruit of mitral stenosis. Fisher suggests that this diastolic sound may indicate temporary dilatation of the heart. The sound heard in the diastolic

interval in association with a dilated heart, may be either a sound separated by an interval both from the second or the first sound, or it may be a low-pitched presystolic rumble, which may also alternate with a diastolic sound. The presystolic rumble of a dilated heart is probably too low pitched to give much difficulty in diagnosis, and when changed for a diastolic sound the accentuation and rhythm may be that of the *bruit de galop*. But there is, he believes, a diastolic murmur heard in the dilated heart of children which is presumably due to that dilatation and is indistinguishable from the diastolic sound of mitral stenosis. It may be best heard at the impulse or just outside, or over the right ventricle in the third and fourth or fourth and fifth intercostal spaces. In one position it is probably produced in the left ventricle, in the other in the right. In the same heart it may sometimes be best heard in one position, sometimes in the other, and then points probably to general dilatation. Whether such a murmur indicates mitral stenosis or dilatation of the heart is a question of some importance. The most common cause of dilatation is adherent pericardium, and death from this condition is much more common in children than from mitral stenosis; so that the immediate prognosis of a diastolic sound indicating a dilated heart is much graver than that of one pointing to mitral stenosis.

THE COEXISTENCE OF INFECTIOUS DISEASES.

CAIGER (*British Medical Journal*, May 5, 1894, p. 969), at a recent meeting of the Epidemiological Society, presented a study on the coexistence or close succession of two or more infectious diseases in the same individual. His experience at Stockwell, he said, had satisfied him that such concurrence of infections was as frequent as mere probabilities would explain, and that, so far from affording protection against other diseases, some certainly increased the susceptibility thereto. In the last four years he had seen 362 cases of two and 17 of three diseases running some part of their courses concurrently; in 200 of these the acute febrile stages of two or three coincided. The priority of the several diseases was calculated from their known incubation periods. The primary disease was scarlatina in 197, which was complicated by diphtheria in 97 cases; varicella, in 43; measles, in 31; whooping-cough, in 13; erysipelas, in 10; enteric fever, in 2, and typhus, in 1. Scarlatina was a complication in no fewer than 88 among 97 in which the primary disease was diphtheria; in 20 among 23 of varicella; in 14 of 17 of whooping-cough; in 6 of 9 of enteric, and 9 of 18 of measles, though here diphtheria accounted for another 7. Among the 17 triple attacks scarlatina was the primary disease in 9, and a complication in 4 only, diphtheria holding the highest place with 9. During the past six years 48,367 cases of scarlatina had been admitted into the hospitals of the Asylums Board; of these 3166, or 6.54 per cent., were complicated, 1094 with diphtheria, 899 with varicella, 703 with measles, and 404 with whooping-cough; the relative numbers of diphtheria and whooping-cough being probably owing to the fact that many had already had whooping-cough in infancy, while diphtheria, though less frequent, might and often did recur: these four diseases accounted for 3100, or all but 66. The questions suggested by these figures were: (1) Did any disease render the individual less or more susceptible to infection by another? (2) Did the

primary disease in any way influence the course or character of the secondary one as regards (*a*) incubation, eruption, etc., periods; (*b*) severity of the disease; (*c*) distribution of local phenomena; (*d*) liability to sequelæ and other complications? The conclusions at which he arrived, after eliminating the influence of age incidence, seasonal prevalence, actual frequency, etc., were, first, that there was no such thing as antagonism between any, but rather the reverse, increased susceptibility being brought about, generally or locally; that is, first, by the lessened power of resistance induced by a disease attended with grave constitutional disturbance; and, secondly, by the local inflammations facilitating the development of the contagia of diseases known to affect the mucous membranes or tissues in question. Thus, an attack of varicella exerted no influence on any that might follow, but when scarlet fever was the primary disease, varicella, favored also by the quasi-dermatitis left behind, might rival unmitigated smallpox in intensity of fever and extent of eruption. Scarlatina was frequent and dangerous after diphtheria, but diphtheria following scarlatina was still graver, since the scarlatinal throat, teeming with staphylococci and streptococci, was a perfect soil for the bacillus of Loeffler. So, too, while the general phenomena of measles might be aggravated by previous diphtheria or scarlatina, and in the latter conjunction the rash would be intensified, an attack of diphtheria following on measles was even graver than the post-scarlatinal, since it inevitably attacked the larynx and trachea, and tracheotomy was very rarely of any avail. Measles and whooping-cough were known to follow one another or to coexist, mutually increasing the susceptibility of the individual. The author had never found the incubation period of a disease affected, but the presence of scarlatina accelerated the appearance of the rash in measles by a couple of days.

MEASLES COMPLICATED BY SUBCUTANEOUS EMPHYSEMA.

VARNALI, of Bucharest (*Revue mensuelle des Maladies de l'Enfance*, May, 1894, p. 266), reports such a case occurring in a child of ten years. The patient, when seen with the disease in full eruption, presented over the whole trunk and neck a subcutaneous emphysema; over the præcordial region there was a gaseous tumor the size of an orange. The disease was of four days' duration, and was uncomplicated by broncho-pneumonia; the emphysema had appeared suddenly after a paroxysm of coughing, followed by vomiting. The child had had an attack of whooping-cough about seven or eight months previously.

The author discusses the question of causation to explain how in the violent convulsive paroxysms of a whooping-cough the accident had failed to occur, but had followed a simple attack of catarrhal cough of measles several months later. He offers the following hypothesis: that the microbe of measles, whether that of Babes or another, had produced in the bronchial vessels a congestion and diapedesis, and that this lesion had caused atelectasis of some pulmonary lobules, with vicarious emphysema of other lobules. In the case of the patient, the old lesions left by his whooping-cough, in conjunction with the new, had produced a high intra-pulmonary tension, whence the rupture of a vesicle near the hilum and the production of the subcutaneous emphysema by way of the anterior mediastinum.

This explanation is in accord with the theory advanced by Barthez and Sanné concerning the production of atelectasis by congestion of the interlobular vessels, in opposition to the theory of Gärtner and Virchow—the theory of the ball-valve.

THE OPERATIVE TREATMENT OF COLD RETRO-PHARYNGEAL ABSCESS IN THE CHILD.

CONTRARY to the teaching of Etienne, Watson, Cheyne, Burkhardt, and Phocas, who prefer, for the child as well as for the adult, opening through the neck, ROCHARD (*La Médecine Infantile*, January 15, 1894) advises an incision through the pharynx, and examines the objections which have been made to this plan of treatment. The hemorrhage is always moderate when the incision is in the median line, and wounding of the displaced carotid would not be possible except when the abscess was not median, but to the side, a condition demanding different treatment. The irruption of pus into the air-passages can be avoided, after incision, by rapidly turning the child's face downward. The difficulties in getting the mouth open and making the incision are easily overcome with a little patience. The principal objection remaining refers to the danger of local infection, which has especially prompted operation by an external incision. But despite the proximity of a focus of infection like the buccal cavity, accidents (detachment, purulent infection) can be scarcely said to occur, so rapid in the child is the cure of a cold abscess opened at the proper time. Opening by way of the neck, on the other hand, requires a most delicate and dangerous operation, which should not be employed except when the abscess is prominent in the neck or when it is very large.

THE ASSOCIATION OF URTICARIA WITH RICKETS AND DILATATION OF THE STOMACH.

ACCORDING to Comby, urticaria in children frequently accompanies rachitis and dilatation of the stomach. This view has received confirmation from a study by FUNK and GRUNDZACH (*Monatsh. f. prakt. Dermat.*, Feb. 1, 1894), who submitted forty-five children suffering from urticaria to a careful clinical examination, and in all cases found symptoms of rachitis, such as frog-belly, head sweating, deformity of the thorax, etc., as well as the physical signs of a dilated stomach. To determine the existence of dilatation the authors employed the method of auscultation by stethoscope applied over the epigastrium while the limits of the stomach were being marked out by percussion. In this way the differences of sound emitted by the stomach and the intestines are very clearly appreciable, each percussive stroke over the region of the stomach transmitting to the ear a peculiar succussion, which is completely absent when the intestine lies beneath.

This method of "auscultatory percussion" has shown in children affected with urticaria and rachitis, with chronic dyspepsia, that the inferior limit of the stomach descends, after ingestion of liquids, to the level of the umbilicus, or even one or two centimetres below—a manifest sign of gastro-ectasia; while with children free from digestive trouble this limit remains always six or seven centimetres above the umbilicus after ingestion of food.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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"SPOROZOA" AND CARCINOMA.

FROM time immemorial the causation of tumors has been shrouded in obscurity. Theories of their origin have from time to time sprung up, but each has in turn proved unsatisfactory in some one or more particulars, and has been discarded in consequence. What more natural than at the present time, when disease after disease is being shown to depend upon the invasion of the body by living organisms, a similar causation should be suggested for the malignant tumors, particularly as in some few respects they bear a slight resemblance to some phenomena of the infectious diseases? Bacteria were first sought, but no etiological relationship has ever been shown between those occasionally found and the tumors in which they occurred, and this, with the distinct fundamental differences between the tumors and diseases of bacterial origin, has brought about a general belief that if tumors are dependent for their origin upon the growth in the body of living organisms, those organisms are of a nature different from the bacteria.

In 1889 Thoma and a number of other observers discovered small bodies in epitheliomata, whose rounded shape and general appearance suggested their relationship to several of the protozoa occasionally parasitic in man and some of the lower animals. So great was the interest awakened by these observations, that during the succeeding four years more than one hundred and twenty separate articles made their appearance upon the relation of these bodies to carcinoma alone.

It is manifestly impossible for us here to pass in review such a mass of literature, but we would call attention to an able summary of it by STROEBE, in the *Centralblatt für allgemeine Pathologie und pathologische Anatomie*, 1894, v., Nos. 1-3, and to a few of the conclusions reached by him after a careful review of the whole.

The bodies in question are spheroidal or irregular in shape, and have been found in and between the epithelial cells. They are stained somewhat irregularly by the aniline dyes. Occasionally the appearance of a nucleus is present, but usually they appear to be simply irregular masses of protoplasm, usually rather homogeneous in appearance. They have been described both in the cell body and in the nucleus of the epithelial cells. Their resemblance to certain developmental forms of the sporozoa has fastened this name upon them.

Despite the critical study which has been given to the relation of these bodies to carcinoma, the only argument in favor of accepting them as the exciting cause of cancer rests upon their morphological resemblance to psorospermia

and to the corpuscles of *molluscum contagiosum*. The difficulties in the way of this view are, on the other hand, both numerous and weighty. The great irregularity in size and shape of the bodies described, and the diversity in the staining quality and in the nature of the substance composing them, make it evident that a number of quite distinct entities have been described by different authors. Some of these differences might be explained by the discovery of a definite life-history passing through several forms, but all efforts to develop such have failed. Nor has anyone been able to detect any motion, growth, or change of any kind indicative of life in the so-called sporozoa, and all attempts to cultivate them outside the body on appropriate culture media have failed. Without cultivation on artificial media and subsequent inoculation with the production of carcinoma as its result, the proof that they bear an etiological relation to the tumor must be imperfect, for even granting that they are living sporozoa they might equally well be harmless parasites which had found entrance through ulcerations or otherwise to the carcinomatous tissue. It is true that a few attempts to inoculate carcinoma from one individual to another have succeeded, but in all of them a considerable portion of tissue was transplanted.

The weight of evidence seems to point, then, to the "sporozoa" as nothing more than degeneration products of the epithelial cells. This view is held by the majority of those who have studied them, and is supported by the irregular shape and occurrence of the bodies, by the well-recognized tendency of the cells of carcinoma to undergo degenerative changes, by the more abundant occurrence of the bodies in the medullary variety of carcinoma in which the degenerative changes are most frequent, and in the epitheliomata (flat-celled carcinomata) of the skin in which more or less ulceration and degeneration have been present.

The nature of the degeneration is undoubtedly different in different cases. Some of the appearances are explained as the result of degeneration of the nucleus, some as the result of degeneration or vacuolation of the cell body, and some as the result of penetration of leucocytes, red corpuscles, or other cells into and between the bodies of dead or degenerate cells of the tumor.

Stroebe concludes that, while a possible parasitic origin of carcinoma cannot be definitely denied, there is as yet no positive evidence whatever in favor of such a view.

BACTERIAL FEVER: ITS ANTITOXIN.

CENTANNI and BRUSCHETTINI (*Deutsche med. Wochenschr.*, 1894, No. 12, 270) have continued the investigation into the cause of the fever of infectious diseases begun by the former (cf. *THE JOURNAL*, June, 1894, p. 743), devoting their attention particularly to the induction of immunity to the pyrotoxic effect of the bacterial poisons and to the antagonism of the blood serum of immunized animals to the fever of infectious diseases.

His earlier experiments having convinced Centanni of the identity of the fever-producing element of all pathogenic bacteria, he selects for his experiments upon immunity to it the serum of rabbits immunized to the effects of the influenza bacillus. Injection of this serum prevented the pyrotoxic effect of injections of the "pyrotoxina bacterica," prepared from several distinct

species of bacteria, and allayed fever which had been produced by previous injections of the pyrotoxin. The same result was obtained when fever-producing bacteria of various species were inoculated. Furthermore, the antipyretic and protective action of the blood serum of immunized animals was found to last for a considerable time after the injection.

If further experiment shall confirm these results they are of great importance, for they are confirmatory of the idea advanced by Centanni in his former paper, that the fever-producing factor of the bacterial poisons is the same in all species, and they suggest that in the treatment of the fever of infectious diseases the blood serum of animals made immune to the pyrotoxic action of any species of bacteria may prove a most valuable therapeutic agent, not only by lowering the temperature but by ameliorating the general condition of the patient. The authors are now testing the correctness of this inference upon patients suffering from febrile diseases.

PNEUMATURIA.

HEYSE (*Zeitschr. f. klin. Med.*, 1894, xxiv. 130) records an interesting case of gas-formation in the bladder of a patient suffering from myelitis with retention of urine. After catheterization had been practised for some time, gas was noticed to escape through the catheter, and percussion elicited a tympanitic note over the bladder. The autopsy not long afterward disclosed gas in considerable quantity in the bladder, ureters, and in the substance of the kidneys. Cultures showed the presence of a short bacillus resembling in all particulars, except its virulence in animals, the bacterium lactis aërogenes of Escherich. Introduced under the skin, into the joints and pleural and abdominal cavities, and in artificial cultures, its growth was always accompanied by gas-formation. It is believed by Heyse to have been introduced with the catheter into the bladder in his case, and to have been the cause of the pneumaturia.

PEPTONURIA.

THE occasional occurrence of peptone in the urine has long been recognized, but its exact diagnostic and prognostic importance has been uncertain. With a view to throwing some light upon this subject, ROBITSCHKE (*Zeitschr. f. klin. Med.*, 1894, xxiv. 556) has examined carefully the urine of 121 patients suffering from various disorders, with the result of finding peptone in the urine in 60 of them. He believes that peptonuria occurs physiologically only during the puerperium, and that its occurrence at any other time is to be regarded as pathological. As a rule, it is indicative of tissue degeneration, as the result of which peptone finds its way into the blood and is excreted by the kidneys. The mere presence of the peptone in the blood and in the urine seems to have no special symptoms associated with it, and as it occurs in a great variety of conditions of which tissue-degeneration is a part, its diagnostic significance is thought to be but slight.

THE ETIOLOGY OF ACUTE ARTICULAR RHEUMATISM.

A NUMBER of the clinical features of acute articular rheumatism have suggested to the minds of many the probability that it belongs to the ever-growing class of infectious diseases. Its acute onset and febrile and self-

limited course, its complications, and the frequent involvement of the joints as a complication of many infectious diseases, are regarded as supporting this theory. The careful investigation of a typical case of the disease by SAHLI (*Deutsches Archiv f. klin. Med.*, 1893, p. 451), has added the evidence of the bacteria themselves. Endocarditis, pericarditis, and pleurisy were associated with the joint lesions. There was no suppuration. Bacteriological examination disclosed the presence in all the lesions of a micrococcus, identical morphologically and culturally with the staphylococcus citreus, but of very low virulence when inoculated into animals as compared with it. As there was no ground to suppose a mixed infection in this case, Sahli regards this germ as its exciting cause. He is in doubt whether the germ discovered is a distinct species or whether it is merely a staphylococcus citreus of degenerate virulence. He is inclined to the latter view because of the frequent association of rheumatism and endocarditis, whose intimate relationship to the pyogenic cocci has been repeatedly shown.

A note appended to the report of this case states that in several other cases more recently examined, similar cocci of low virulence have been found.

THE RESISTANCE OF TYPHOID BACILLI TO DRYING, AND THE POSSIBILITY OF THEIR DISSEMINATION THROUGH THE AIR.

UFFELMANN (*Centralbl. f. Bakteriolog. u. Parasit.*, 1894, xv. 133) has investigated the power of the typhoid bacilli to resist drying when mixed with earth, sand, cloth, and other similar substances which might be soiled by the dejecta of typhoid patients. Small portions of these substances, after being sterilized, were infected with bouillon cultures of the bacilli, and were set aside in the shade and kept at the ordinary room temperature. After a variable length of time nutrient gelatin was inoculated with small portions of the various substances. In this way the bacilli were found to have survived drying in garden earth for 21 days, in sand for 82 days, in sweepings from the house and the street for 30 days, on linen for 60 and 72 days respectively, on buckskin for 80 days, and on wood for 32 days. Uffelmann distinctly states that these numbers are not to be taken absolutely, for under somewhat different conditions of moisture of the atmosphere or of temperature, the viability of the bacilli might be quite distinctly longer. At all events these experiments show the power of the typhoid bacilli to resist drying for a very considerable time, and they suggest the possibility of the dried bacilli being blown about in dust from the room or clothes of those suffering from the fever, and of thus infecting milk, water, or other foods. Uffelmann thinks it very questionable whether the disease can be set up by bacilli drawn into the lungs in respiration.

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INFLAMMATION OF THE URETERS IN THE FEMALE.¹

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It is for the purpose of calling attention to a disease about which little has been said and written, and especially to its causation and treatment, that I have prepared this paper. I am convinced that ureteritis is common, that it is often overlooked, and that it is mistaken for other conditions in no way connected with it except in location.

FREQUENCY.—My knowledge of this disease extends over only a few years, dating from a paper by Dr. H. A. Kelly,² in 1888, and a personal visit to him, in which he kindly taught me to recognize the ureters by palpation. Since that time I have met with many cases—some of them recent, but a larger number of many years' duration. Some of them I have seen only in consultation and have no knowledge of their progress; others I have followed for a longer time.

From the number met with, I am convinced that inflammation and irritation of the ureters is exceedingly common, and that its general recognition is a matter of great importance. As yet the text-books are almost silent on the subject, the latest—Garrigues' excellent work—not mentioning it. In fact, the literature on the subject is exceedingly scanty.

In order to prepare for what I have to say, I must first refresh your memories regarding the anatomy of these important ducts.

ANATOMY.—The ureters are two delicate tubes leading from the pelvis

¹ Read before the American Gynecological Society, Washington, D. C., May, 1894.

² "Relation of the Ureters," Gynecological Trans., 1888.

of the kidney to the bladder. They run nearly parallel as far as the brim of the pelvis. After entering the pelvis they run downward, backward, and outward to the side of the pelvic wall, to a point near the spine of the ischium, where they hug the bone closely. Then, reversing their course, they come nearly together where they enter the bladder. In length they never exceed fifteen inches, averaging between ten and twelve inches (Van Hook). The point opening into the bladder is about three-quarters of an inch in front of the cervix; the points of opening are from one to one and one-half inches apart, and one inch from the neck of the bladder.

Van Hook¹ calls attention to the fact that the ureter has three points of diminution of calibre, which may give rise to mistakes in the search for pathological stenosis. The first is between one and one-half and two and one-half inches from the pelvis of the kidney, according to Dr. Tangreary's² measurements. The second is at the junction of the pelvic and vesical portions, and the third (in three out of five) is where the ureter curves over the iliac artery.

It is in the latter part of their course, where they pass under the base of the broad ligament and through the bladder wall, that they can best be recognized by the examining finger. An exact appreciation of their position in the pelvis is, therefore, necessary before we can expect to study them. By palpation they can be recognized, especially when enlarged by disease, as two cords, running from a point a little in front of the uterus and a little to one side of the median line, directed at first toward the sides of the pelvis, and then curving somewhat sharply backward until they go beyond our reach near the spine of the ischium. In front of the uterus their ends are separated by an inch or a little more of space. Tourneur³ claims that, when enlarged by disease, they can be distinctly palpated through the abdominal wall above the pelvis.

That the ureters may be the seat of disease has long been recognized. The causes and nature of their diseases are only now beginning to be studied and the diseases to be regarded as independent pathological entities.

Unquestionably the most common disease is inflammation, and I have learned by observation to recognize seven causes for this trouble.

CAUSES OF INFLAMMATION:

1. Injuries during childbirth.
2. Previous disease of the bladder.
3. Gonorrhoea.
4. Suppuration of the pelvis of the kidney.
5. Pelvic disease, such as pelvic peritonitis, cellulitis, and tumors.

¹ W. Van Hook: "Surgery of the Ureters," Journ. Amer. Med. Assoc., December, 1893.

² Quoted by Van Hook.

³ C. Tourneur: *De l'Urétéríte et de la Péri-urétéríte*. Paris, 1886.

6. Abnormal conditions of the urine.

7. Tuberculosis.

1. *Injuries from childbirth.* In our *Transactions*¹ for 1890, Dr. Skene called our attention to the first of these causes and the resulting effects. During the last winter I met with several cases. In each there was a chill, with high fever, pelvic pain, and vesical irritation, coming on several days after labor. The labors were none of them especially severe or long, but were all in primiparæ. A careful pelvic examination showed nothing wrong with the uterus, tubes, or pelvic peritoneum; but pressure over the lower end of one of the ureters showed great tenderness. After the third or fourth day an examination of the urine revealed an acid reaction with a large amount of pus and some blood. There was no mucus or other evidence of bladder trouble. As Skene points out, bimanual manipulation over the kidney on the affected side showed some tenderness.

In none of these cases was there a history of any pre-existing disease of the bladder or kidney. In the first case I gave a grave prognosis; but the patient recovered, as did the subsequent cases. Skene met with one fatal case.

Skene considers that the cause is to be found in pressure on, or injury of, one or both ureters by the child's head or the blade of the forceps, the pendulum movement of the forceps being particularly prone to produce trouble. Especially is it likely to occur if the head pushes down an undilated cervix and the bladder with it.

A most instructive account of an autopsy is to be found in the article referred to.

Besides these more serious lesions, I have noticed an irritation lasting a long time, and evidently started by the pressure of the child's head, but kept up by other causes. I will here cite one illustrative case:

I delivered Mrs. A. of a large child some years ago with forceps. The head was R. O. A. Following the labor she had a mild attack of sepsis, due to the retention of a small bit of very adherent membrane, from which she fully recovered. Soon after the labor she complained of a frequent desire to urinate, and it was necessary to pass the catheter quite often. This symptom seemed to persist, and her family physician tells me that he treated her for "irritable bladder" for a long time.

A few months after her recovery she was in one of our large cities; and, as her bladder began to trouble her again, she consulted one of our distinguished Fellows. He sent her back to me, advising that I sew up very slight tears in the cervix and perineum in hopes of relieving, as he said, the tenderness in the right broad ligament. (Cellulitis?) On examination, I found the right ureter very tender, and the urine quite acid. I gave her large doses of alkalies, combined with an alkaline mineral water, and in a few weeks she was entirely relieved of the distressing symptoms.

¹ A. J. C. Skene: "Injuries of the Ureters during Labor," *Gynecological Transactions*.

Undoubtedly the trouble began in childbed, from the pressure of the head (R. O. A.) on the right ureter, and was only relieved when all external irritation—the hyper-acid urine—was removed.

2. *Previous bladder disease.* In certain deformities of the bladder, such as fissure, the ureters are generally greatly dilated. In cystitis, except in the gonorrhœal form, extension to the ureters either does not occur or is a late manifestation. If a neoplasm or hypertrophy of the bladder obstruct the exit¹ of the urine from the ureters, dilatation of the ducts gradually takes place. "When the ureteric openings are dilated so that urine regurgitates at each vesical contraction," infection of the ureters is sure to follow with serious results.

Some authors have thought that all diseases of the ureters have their origin either in the bladder or the kidney, the ureteritis being called "ascending" or "descending," as the case may be. It has never been my fortune to see a case of ascending ureteritis, except when it has had a gonorrhœal origin. Still it may be possible that an ordinary acute septic cystitis may be conveyed to the ureters. But, if this be so, it must—in the female, at least—be rare. Coe² mentions having seen two cases of pyelitis follow cystitis. The course of the infection was presumably by the ureters.

3. *Gonorrhœa.* That gonorrhœa may extend to the bladder is generally acknowledged, though gonorrhœal cystitis in women is either by no means common or does not often attract attention. If gonorrhœa once reaches the bladder, the inflammation may also extend into the ureters. It is possible that after the disease has subsided in the bladder it will still lurk in the ureters, either because the conditions are more favorable, or because, the bladder symptoms attracting notice, treatment is directed to the bladder but does not reach the ureters.

I have seen several cases in which I am certain that this had occurred. There was a direct history of gonorrhœa, and other evidence in the presence of inflamed and suppurating Fallopian tubes. I have no doubt that many of the failures to obtain entire relief from pain after coeliotomy for pus tubes are due to coincident but unrecognized gonorrhœal ureteritis.

4. *Pyelitis and pyelonephritis.* Suppuration of the pelvis of the kidney and of the kidney itself is more often, in my belief, due to previous disease of the ureters than *vice versa*. Still, many cases are recorded where the disease is supposed to have been due to emboli or other trouble starting *de novo* in the kidney or pelvis. Unfortunately, in the many recorded cases the condition of the ureters is seldom mentioned. A calculus formed in the pelvis of the kidney frequently leads to suppuration; and with almost absolute certainty, the ureters will

¹ Skene: Diseases of the Bladder and Urethra in Women, p. 242.

² "Deaths from Visceral Affections after Ovariectomy," Gynecological Transactions, 1889.

then, sooner or later, be involved. This is the so-called descending ureteritis. It is my experience that most of the cases where the trouble begins in the kidney or its pelvis are either due to calculi or tuberculosis.

5. *Pelvic and uterine disease.* The relations existing between uterine and pelvic diseases and diseases of the ureters have been carefully worked out by Engelmann.¹ With many of his conclusions I disagree *in toto*. Time fails me to carefully criticise his paper, and I shall only allude to a few points of difference, while quoting many points of agreement.

I have very little faith in the extension of inflammation from contiguous structure, except along surfaces. I do not believe that ureteritis ever follows an inflammatory action in the tubes, ovaries, pelvic peritoneum or parametrium by direct extension. If the two coexist, I would look either for a common cause in a gonorrhœal infection, or the ureteritis may be due to the inflammatory exudation causing pressure and obstruction.

Still less can I believe that an anteflexed fundus can by pressure, even for a very long time, and "under conditions favoring the progress of the disease," induce a ureteritis, pyelitis, and pyelonephritis.

I wish to enter my protest against what I believe is a common mistake. An anteversion or anteflexion is found, and with it a degree of vesical irritability, which is attributed to the pressure of the uterine body on the bladder. It seems to me to be ridiculous to suppose that an organ which weighs only one and one-half ounces, one-half of which is supported by the vagina, can produce so much trouble by its weight alone. Especially is this so when we see the bladder pushed out of place and pressed upon by tumors without any special symptoms of this kind. Under such circumstances, I have never failed to find some other condition to account for the vesical irritation, usually an abnormal condition of the urine.

Pressure on the ureters is recognized by all writers on this subject as a frequent cause of ureteral disease. That a sufficient degree of pressure may be made by a firm neoplasm, such as a uterine fibroid or ovarian tumor, cannot be doubted. In cancer also the disease itself, or the zone of infiltration which surrounds it, may directly press upon and even occlude a ureter. Obstruction from any cause may lead to ureteritis, pyelitis, and its consequences. In ulcerating cancer, if the disease opens the ureter, direct infection, with all its results, may take place.

Engelmann holds that "above all, retroflexion and prolapsus uteri" may cause pressure on the ureters. As far as retroflexion is concerned, I have never seen any clinical evidence that this may occur; nor does it seem likely from the anatomical arrangement of the parts. The ureters

¹ "Renal Disease following Utero-ovarian Lesions," Gynecological Trans., 1889.

are so far separated, directly behind the cervix, that there is plenty of room for an enormously enlarged retroflexed fundus between them. Where they pass over the brim of the pelvis they are well protected by the promontory of the sacrum, and are, moreover, too high for a retroverted uterus to reach them. Nor is the weight of the uterus enough. In prolapse, the course of the ureters may be interfered with, but in the many cases of prolapse and procidentia that I have met with I have never seen anything to support this conclusion.

It is in Engelmann's third class that it seems to me the most evident connection between diseased pelvic viscera and diseases of the ureters is to be found. He claims that "functional derangement and finally morbid changes are produced by nervous influences emanating from the diseased pelvic viscera."

This may be brought about in two ways: "as reflex phenomena," or "by perverted action of the secretory nerves, due to the intimate connection of the uterine and renal plexus."

My interpretation of the phenomena would be as follows:

In the first place, it is well recognized that the stomach and other digestive organs bear a very close relationship, as regards their functional activity, to the sexual organs. Now, if the digestive processes are disturbed by primary disturbances in the pelvic viscera, the resulting indigestion will cause abnormal conditions of the urine. It is in this way, as I shall explain later, that I believe inflammation of the ureters is generally brought about.

Perverted action of the nerves governing the renal function often results in a deficient amount of urinary excretion. This condition, generally spoken of as "renal insufficiency," is, I believe, often a result of a stimulation of the inhibitory influence of the nerve centres, due to peripheral irritation in the sexual organs. It is often found associated with ureteritis, and, I am fully persuaded, often stands in the relation of cause and effect.

6. *Abnormal conditions of the urine.* It is my belief that abnormal states of the urine cause the great majority of cases of ureteritis. The urine which is at the bottom of the trouble is excessively acid, often depositing a thick sediment on standing. It is scanty and high-colored; or this condition may alternate with a profusion of pale limpid urine of very low specific gravity. The constant passage of this abnormal urine irritates the whole urinary tract, and is, I am fully convinced, the most common cause of inflammation of the ureters.

This particular kind of urine will at once be recognized as that characteristic of the condition often known as lithæmia. To detail the causes of lithæmia is beyond my limits.

One point I must mention again, and that is renal insufficiency. In many of these cases I have found the total amount of urine reduced to

eight or ten ounces in the twenty-four hours. Such urine is often of low specific gravity, showing a great deficiency in the total amount of solids excreted. It is generally acid and contains a variety of crystals. The recognition of this condition—whether we consider it only as one factor in lithæmia or as a separate affair—is of the utmost importance for the successful treatment of these cases.

Renal insufficiency being often the result of reflex action, as already explained, we must look for the exciting cause; and this we may find in the pelvic organs or in some distant organ, as, *e. g.*, in the eye. If it be in the pelvis—or wherever it may be—we shall make little progress in the management of our case until we recognize the cause.

I have noticed that some kinds of fruit seem to cause a state of the urine which is particularly obnoxious to the urinary mucous membranes. Strawberries are especially noticeable in this respect.

7. *Tuberculosis.* Tuberculosis as a cause of disease of the ureters has been occasionally recognized.

The case of a young girl came under my notice a year or more ago. The ureters were enormously enlarged, and there was much pus in the urine. I turned her over to Dr. Chas. G. Stockton for general treatment, and Dr. Bergtold found tubercle bacilli in the urine. She later went to New York, where her kidney was opened, and a condition was found which was called tubercular pyelitis. A few months ago Dr. Roswell Park removed this kidney, finding numerous foci of pus and other evidences of tubercular disease.

It may be questioned whether tubercular disease of the ureters exists independently of the same disease in the kidney.

PATHOLOGICAL ANATOMY.—I have had no opportunities of studying this disease post-mortem, and have not had access to any work treating fully the pathological anatomy of the ureters. Judging from what I have observed clinically, and from the reports of cases by other observers, I think we may distinguish several forms or stages of ureteritis.

First, the catarrhal form, in which there is a little swelling of these tubes with desquamation of the epithelial lining. It is my belief that in slight cases, judging from the evidence gained by examination as well as from the symptoms, the force of the disease is first spent on the lower end of the ureter, especially the part in front of the broad ligament.

In other cases the surface of the tubes seems to give forth a plentiful purulent secretion, which indicates an ulcerated or granulating condition of their lining membranes. Tourneur says that when these ulcerations occur a thickening in the surrounding connective tissue takes place with, perhaps, adhesions of the peritoneum, giving an irregular outline to the course of the ureters.

Sometimes the tube is greatly thickened by inflammatory deposits in the walls. This may reach a point where the ureters are as large as a

lead pencil, or even larger. In the case of obstruction, dilatation, even to an extreme degree, may take place, accompanied by a certain amount of thickening. Tourneur likens these dilated and thickened ureters to the arteries in a cadaver.

I have now under observation a case in which the ureters are greatly thickened, and in which the right one seems to be dilated or sacculated just behind the broad ligament.

The pelvis of the kidney is doubtless generally more or less involved with the ureters; but that it is always so is not proven. A physical examination in several cases of so-called "pyelitis" has shown that the ureters were the parts chiefly involved. That these conditions may end in involvement of the pelvis and of the kidney itself, I have had clinical evidence. In several cases perinephritic abscesses have developed; and in two abscess of the kidney has developed, as proven by operation.

Usually both ureters are involved in the pathological processes; but often one side—usually the left—is much more seriously affected than the other.

COINCIDENT AFFECTIONS OF OTHER ORGANS.—The bladder is rarely directly affected by coincident inflammation; that is, there is seldom a general cystitis. But in a case recently examined, in which the pain and tenderness are confined to the left side, the surface of the bladder around the mouth of the ureter, as shown through a Kelly speculum, was quite red and congested. The urethral orifice on this side is only half the size of that on the unaffected side.

In another case there was a patch of granulations around the orifice of the right ureter as large as a twenty-five-cent piece. The possible existence of stricture at the point of opening is something to be considered.

It is a matter for future investigation whether the vesical tenesmus is not always due to some localized congestion, granulations, or ulceration around the mouth of one or both ureters on the bladder wall. In consequence of the constant emptying of the bladder its walls may become contracted and almost incapable of expansion. This fact must be taken into consideration in the treatment, and means taken to overcome the contraction.

Other complications are the various forms of tubal, ovarian, and uterine disease. Endometritis is the commonest. Retroversion and prolapse are not uncommon. But in a considerable number of the cases met with the sexual organs have been only slightly affected.

It will be at once admitted that some of the conditions described as producing ureteritis will also in time produce changes in the kidney, especially contracted or granular kidney. This makes the disease a more serious one. Whether there be any relation between floating, or movable, kidney and ureteritis I am unable to say, never having met with a case in which the two conditions coexisted.

Late in the disease, abscesses, either in or around the kidney, or else around the ureter, may form. I have seen several instances of perinephritic abscess, and one which I think had its origin in the cellular tissue around the ureter. It pointed in the iliac fossa. As already said, Bright's disease may come to end the scene.

SYMPTOMS.—The most constant symptom is frequent micturition, which may even become continuous. In only a very few cases with which I have met has this symptom been absent. The desire is most frequent during the day, but the rest is often broken by calls to empty the bladder at night. In the worse case I ever saw, when I was summoned the woman had been sitting on a commode for a month, night and day, only occasionally snatching a moment's sleep. The desire to urinate was constant.

In this case the ureters were as large as lead pencils and exquisitely tender; there was pus in the urine, but the bladder seemed to have the usual tolerance, that is, there was no special pain on distending it with fluid. Relief was obtained, however, by the establishment of a vesico-vaginal fistula.

The next symptom in importance is pain over the ureters—one or both—the left side being more commonly affected than the right. This pain is described as burning or boring, and is nearly constant, but is almost always greatly aggravated as the menses approach, even becoming agonizing during the flow. This peculiarity has often led to an error in diagnosis, the disease of the ureters being mistaken for ovarian disease. Several cases have come to me to have the ovaries removed, when all the trouble lay in the ureters. One case in particular has been examined by several excellent men, all agreeing that the ovaries were the seat of the intolerable menstrual pain, and ought to be removed. When I last saw the woman she still possessed her ovaries and was perfectly well.

One curious symptom I have noted as frequently existing in cases associated with renal insufficiency, *i. e.*, an absolute distaste for water. I have frequently told the patient, without asking her, that she did not drink water enough, and she has replied that she did not drink any. In some cases water seems actually to produce nausea. This distaste for water is often very hard to overcome.

Should cystitis coexist, the symptoms of this disease may entirely mask the other. Again, should the kidneys become affected a new train of symptoms will arise. In lithæmic patients other manifestations of the condition may develop. Many of these patients are subject to bilious attacks and sick headaches. Gastric and intestinal dyspepsias are common, and there is often a history of inherited rheumatism or gout. Great depression of spirits is not an uncommon symptom. Even in the lithæmic cases the symptoms often seem to date from childhood.

Sometimes the disease is intermittent, attacks coming now and then; but usually it runs an essentially chronic course. I have met with cases which had lasted for twenty years, gradually getting worse, until life was very nearly unendurable.

The pain is sometimes steady, and again it is spasmodic. It may be stationary over the ovarian region, or it may be felt over the hip and down through the iliac fossa. In some cases the pain is intensified by walking; others are unable to ride in any vehicle, the jar and movement causing much pain.

Attacks of gravel or the passage of small stones from the pelvis of the kidney are rather common, and may be distinguished by the usual symptoms. In some cases the passage of plugs of inspissated pus produces symptoms similar to those of gravel.

DIAGNOSIS. This disease may be recognized, first, by the symptoms enumerated; secondarily, by the physical examination; and, thirdly, by an examination of the urine.

It is needless to go over the symptoms again; only it must be remembered that they do not give conclusive evidence. As already stated, the symptoms may be mistaken for those of ovarian, tubal, and uterine disease, on the one hand, and for those of the bladder and kidney on the other. It must be borne in mind that frequent micturition is not always present.

It is on the physical examination, then, that we must place the chief reliance. That the ureter is often easily palpable has been clearly demonstrated. Pawlik, H. A. Kelly, and others have, by their teaching and writing, established this fact conclusively. In fact, there is nothing easier than the palpation of an enlarged ureter in the pelvis. When it is not enlarged the matter is not so easy; and I am convinced that it is not possible to perfectly and clearly distinguish the ureters in all women. If, however, we know their anatomical position, and pressure over these points—and over these points alone—elicits pain, we may, if the symptoms are corroboratory, safely infer that we are pressing upon the ureters, and that they are diseased. Care must be taken not to confound tender spots in the other structures of the pelvis, so frequently discoverable, for the ureters.

METHOD OF PALPATION.—*Pelvic.* The palpation of the ureter in the pelvis is done as follows: The finger is carried along the anterior vaginal wall upward and outward near the brim of the pelvis to one side of the uterus. It is then passed forward, stroking the pelvic wall and carefully feeling for a cord-like body under it. Sometimes a bimanual examination will greatly aid in discovering the ureters. Anybody who has once distinguished an enlarged ureter will be astonished at the ease with which it may be done.

In every case that I have seen, tenderness on pressure was present,

and sometimes to an extreme degree. A feeling of a desire to urinate is often complained of on touching the ureters; and Kelly describes a case in which micturition took place over his hand while examining.

By tracing the course of the ureters carefully with the finger-tips, disease of the bladder and urethra may be excluded. Should bladder tenderness coexist it will be hard to distinguish the ureteritic disease, unless the ureters are enlarged, or at least distinctly palpable.

Abdominal palpation. As already mentioned, Tourneur¹ lays great stress on the palpation of the ureter through the abdominal wall. He says: "At the level of the superior strait the ureter can be found at one-third the distance which separates the anterior superior spines of the ilium."

In women who have borne children and have, in consequence, a relaxed abdominal wall, he claims that it is astonishingly easy to palpate the enlarged and thickened ureters. If there be a peri-ureteritis, the investigation is further facilitated; and in some cases irregularities or swellings are noted along the course of the ureters. If there be simple dilatation without hypertrophy, palpation is more difficult. He considers this as the principal method of determining changes in the form and consistence of the ureters, and consequently of the utmost importance. He cautions us to be careful not to mistake a chain of enlarged glands (the ilio-lumbar) for the enlarged and irregular ureters. These glands are especially likely to be affected in tubercular disease.

His method would seem to supplement the pelvic palpation. For its performance it is necessary that the bowels should be thoroughly emptied, and that the patient should lie on a hard table with the knees drawn up to relax the abdominal walls.

I have never practised abdominal palpation of the ureters.

EXAMINATION OF THE URINE.—This is an absolute necessity, both for diagnosis and as giving important indications for treatment. No examination can be considered as complete unless it embraces an estimation of the amount of urine passed in twenty-four hours, as well as a careful chemical and *microscopical* examination. Many practitioners consider that when they have tested for albumin they have done their whole duty. Such a test is practically useless, showing nothing regarding the abnormalities to be met with in ureteritis.

The urine will often be scanty—I have seen it as low as six ounces in twenty-four hours; always acid in reaction, often hyper-acid, unless cystitis coexists, and often of low specific gravity, 1010 to 1015.

The sediment will consist of urates, uric acid, calcic oxalate, often pus, and a little epithelium. All attempts to locate the seat of the disease by the presence of peculiar types of epithelial cells will fail. In

¹ Loc. cit.

old cases, where pus is present in large amounts, no epithelium will be found. Blood-cells in greater or less proportion will often be found with the pus.

The amount of mucus in the urine will be very slightly increased. There are no mucous follicles in the pelvis of the kidney or ureters.

As the bladder is abundantly supplied with such follicles, the presence or absence of mucus is of much diagnostic value. Urine containing pus without mucus and acid in reaction is, I believe, a sure indication of inflammation in the urinary tract above the bladder—leaving out, of course, the presence of an abscess opening into the bladder.

On the other hand, alkaline (ammoniacal) urine with mucus and pus is a sure sign of cystitis, but does not exclude involvement of the ureters or pelvis of the kidney.

Palpation or catheterization of the ureters is then the resource for deciding whether the ureters are also involved. The presence or absence of albumin may be of some significance. I have never found anything more than the faintest trace of albumin in purulent ureteritis; generally there is none.

The presence of albumin with pus may mean, then, either that the kidneys are affected or that the pus comes from an abscess cavity, the liquor puris furnishing the albumin. The further history of the case will decide which.

It is by no means necessary that the ureters should be much thickened before pus is produced. I have seen it in comparatively recent cases where the ureters were not at all enlarged, but only tender. Under proper treatment these cases rapidly recover.

PROGNOSIS.—The prognosis in a given case of inflammation of the ureter depends entirely upon the stage in which the disease is met with and upon the condition of the ureters as recognized by palpation. If the trouble has not lasted very long, and the ureters are not much thickened or enlarged, the prognosis is good, though the time necessary for a cure will be considerable. In old chronic cases, where great thickening of the ureters has taken place, and where large amounts of pus are found in the urine, the outlook for the patient is certainly not good. It is altogether likely that abscesses will form in or around the kidney, and that the patient will succumb from them, or later from some form of Bright's disease.

Nevertheless, I have seen one case, which I have followed now for nine years, and which has apparently recovered. The trouble began, I infer, with lithæmia and a mild ureteritis, under my care. This was entirely unrecognized and not properly treated. The ureters gradually got thicker; and when I examined her again, some four years ago, I found them moderately enlarged, the disease having then, judging from the symptoms, lasted about five years. Later, she had an abscess of

the right kidney, which was opened and drained, and which left a sinus. Finally the kidney was removed, and the patient is, I understand, now perfectly well. The other ureter, however, is slightly thickened, and may ultimately give trouble.

As already stated, I have seen cases which have lasted twenty years, judging from the symptoms, in which there was only moderate thickening and a small amount of pus in the urine. Other cases run a much more rapid course. It will thus be seen that a prompt recognition of these cases and a proper treatment is of great importance.

TREATMENT.—The treatment may be considered under the heads:

1. Constitutional.

2. Local.

a. Through the urine.

b. Direct local treatment.

3. Surgical.

1. *Constitutional.* From what has been said regarding the causation of this disease, it will be at once seen that constitutional treatment is of the utmost importance. Unless this is carefully carried out we cannot expect to get a normal condition of the urine, which is absolutely essential, not only to prevent the further progress of the disease, but also to favor a cure.

To this end the patient should be put in the best possible environment; have perfect freedom from mental worry and anxiety, in a situation where she can have plenty of outdoor air and exercise, and where everything shall be done to promote the general health. A careful regulation of the diet is absolutely necessary, even where the case be of gonorrhœal origin; for the urine must be kept bland and unirritating under all circumstances. In many cases sugar and starches seem to be very poorly digested. They thus do harm, and are to be avoided. Alcoholics, especially wine and beer, must be given up.

In cases where the kidneys are not acting freely, or where there is marked renal insufficiency, the use of hot-air baths—either the regular Turkish bath, or, better still, the bath given with an alcohol lamp placed under the chair, the patient being swathed in blankets—will produce good results. By this means the skin is made to do duty for the kidneys, and the poisonous excretions which have been retained in the blood are gotten rid of. Moreover, the dry hot-air bath acts as a derivative, drawing the blood to the surface, thus lessening the congestion of the internal organs. Under this treatment the kidneys will quickly resume their work, and the amount of urine will be increased very markedly, notwithstanding the profuse sweating.

Massage is also of great use in many of the cases, and can be used directly after the hot-air bath.

Under all circumstances, but especially where there is renal insuffi-

ciency, I advise the free use of water. The psychical effect is often better if we use a mineral water; but I do not believe that any of the waters in the market contain a sufficient amount of alkali to do very much good. It is the water, and not so much the mineral ingredients that it contains, that accomplishes the result. I have very little faith in diuretics.

The use of alkalies is of the utmost importance, and they should be used long and persistently, in sufficient quantity to keep the urine alkaline, or at least neutral. For this purpose I have used the liquor potassæ in doses of five drops and more; also the acetate and citrate of potassium, and Rochelle salts and bicarbonate of soda. In many instances the salts of lithium are of great value. Etheridge¹ advises lithium combined with potash to increase the flow of urine. In some cases one agent, and in others another, acts. A little trial will prove which has the best effect with each particular patient.

Agents which act upon the liver, especially where there is constipation, are also very useful. To this end I have used podophyllin, leptandrin, euonymin, and other agents of this nature. The greatest care should be taken to see that the bowels act freely. Where there is a history of constipation, flushing of the colon is of inestimable value.

If anæmia exists, the use of iron and arsenic will be beneficial.

It is not necessary for me to enlarge further upon this matter, only to insist that everything must be used to restore the patient's general system to normal condition. In several instances of comparatively recent cases, other means having failed, I have seen the greatest amount of good come from an exclusive milk diet. This must be kept up until the symptoms are entirely relieved and the pus disappears from the urine. I have seen a number of patients entirely cured in this way.

2. *Local. a. Through the urine.* It is well recognized that certain agents are excreted through the urine and have an influence upon the membranes over which they pass on their way out of the body. The various agents ordinarily used in gonorrhœa, such as copaiba and sandalwood oil, have in several instances proven beneficial, especially where there is a great deal of pus in the urine. Sandalwood I have found especially valuable.

I have also tried carbolic acid, salol, and hydronaphthol, with the idea of getting their antiseptic action upon the ureters, or their germicidal action in the urine as they pass out. I cannot say that I have seen any great results from the last-named group; in fact, we are greatly in need of a drug which, when given by the mouth, will produce an antiseptic action in the urine. Benzoic acid, perhaps, comes as near as anything; but, as it produces an exceedingly acid state of

¹ Personal communication.

the urine—hippuric acid being excreted—it does not seem exactly indicated. Its beneficial effects in cystitis with alkaline urine is well known; but I have not seen the same results in ureteritis.

Tourneur praises the essence of turpentine in capsules, two to six, or even eight, a day. He considers that turpentine renders the urine less irritating and at the same time notably increases the amount.

b. Direct local treatment. The discoveries and inventions of Dr. Howard A. Kelly¹ have opened up a new field for the local treatment of diseases of the ureter. By his method it is now in the power of everyone to pass an instrument into the ureters with comparative ease. An operation which was formerly considered very difficult, even for an expert, is thus brought within the reach of all; and, though sufficient time has not yet elapsed for us to have formulated any particular plans of treatment, or to have tested any special drugs, still the general principles of treatment of inflamed mucous membranes may be applied here. I have recently dilated and catheterized the ureters through Kelly's speculum, and am about to institute a series of experiments in the action of various drugs. Of course it will be necessary to go slowly, as we have no means of knowing as yet what the susceptibility of these structures is to the different agents. I propose to try injections of boric acid, weak solutions of nitrate of silver and so on, and see what can be accomplished in this way.

3. Surgical treatment. Much has been written lately in regard to the surgery of the ureters. As yet, however, very little has been done for the application of surgery to their treatment. Personally, I have no experience with anything of this nature further than catheterizing and dilating the ureters. This I have done a few times, and from it alone have never seen any great results, although one case where I dilated the ureters with the catheter passed through the bladder was very much relieved of her pain for a considerable length of time. After about a year the old trouble returned; and before the patient could come to me for a repetition of the operation she died.

TREATMENT OF THE BLADDER.—In one case—the one which I noted on a previous page as having had almost continuous *ardor urinæ*—I procured great relief by making a permanent vesico-vaginal fistula. After that was done, the patient was able to leave her commode, to lie down and sleep well. She died, however, of an abscess which started either around the kidney or outside of the ureter, and opened in the iliac fossa.

In another case in which I opened the bladder, the ureteritis being at that time unrecognized, no relief followed. The patient afterward put herself under the care of a very distinguished member of the

¹ "Direct Examination of the Female Bladder, etc.," Am. Journ. Obstet., January, 1894.

American Gynecological Society, but received no benefit, and, I think, ultimately committed suicide, owing to the severity of her symptoms.

If the bladder be much contracted and very irritable, benefit can often be obtained by distending the bladder with fluids. For this purpose, weak salt solutions can be used, or solutions of boric acid, or other similar agent. If there be granulations around the ureteric openings, congested areas or ulcerations, they can be treated topically by the aid of Kelly's speculum. I have recently scored a brilliant success in the local treatment of such a case.

From what has already been said, it will be seen that much more research is necessary before we can arrive at a truly satisfactory treatment of this affection. If, however, I can succeed in rousing the attention of the profession to its existence and to the necessity of recognizing and treating it, I think that the beginning of the end will have been reached.

CERTAIN CASES OF HETEROTOPIA OF WHITE MATTER OCCURRING IN THE HUMAN MEDULLA OBLONGATA.

BY JAMES D. HEARD, M.D.,
OF PITTSBURG, PA.

(*Communication from the Laboratory of Prof. Obersteiner, in Vienna.*)

IN the extensive literature of the human central nervous system but little mention is made of the presence of congenital histological anomalies in the cord and medulla oblongata. In the cord, Van Gieson¹ could find mention of but four cases of true misplacement of gray matter, while no cases of heterotopia of white matter had been published. In the medulla oblongata anomalous bundles of white matter had been observed in three instances. To these observations Van Gieson added a case of his own, and Schaffer² has since added a fifth. If with these be included the bundle described by Henle³ as an occasional anomaly, but afterwards⁴ identified by him with the respiratory fasciculus, the number of cases rises to six. These six comprise the only genuine cases of heterotopia of white matter in the medulla of which I can find record. The cases are as follows:

CASE I.—In the twenty-first volume of the *Archiv für Psychiatrie*, Prof. Pick⁵ reported the observation of an anomalous bundle of nerve fibres occurring unilaterally in a human medulla oblongata. It commenced at the level of decussation of the pyramids as a small, sharply circumscribed collection of nerve fibres originating from the remains of the lateral column, and occupying a position anterior and somewhat

mesial of the head of the posterior horn. The fibres comprising the column were easily distinguished from those surrounding it by reason of their larger calibre and consequent darker stain (Weigert method as modified by Pal). As the bundle ascended its diameter increased and arching fibres appeared, which separated it from decussating fibres and gray substance. At the level of the upper third of the olive its component fibres separated, and could be followed into the corpus restiforme; while at a somewhat higher level the anomalous structure had entirely disappeared. At no part in its intermediate course could Pick trace any connection between the fibres composing the bundle and surrounding structures. He can offer no explanation as to the physiology of the bundle, but regards it as an abnormal path for the fibres which the corpus restiforme always receives from the lateral columns. He identifies it with the bundle of Henle mentioned above, which is described in the first edition of the *Handbuch der Nervenlehre* as "one or as two cylindrical and sharply circumscribed nerve-like cords of occasional occurrence, and having a diameter of 25 to 50 mm., always occurring unilaterally, and situated in the posterior boundaries of the reticular substance, anterior to the head of the posterior horn." As Henle subsequently identified this structure with the respiratory fasciculus (*Handbuch der Nervenlehre*, 2d edition), Pick's observation possesses the merit of a rediscovery.

CASE II.—Cramer,⁶ in the examination of the central nervous system in a case of cerebellar hemiatrophy, discovered an anomalous bundle of white fibres situated upon the side of the lesion, and corresponding in size, cross section, and location with the bundle of Pick. It arose at the level of decussation of the pyramids, and reached its greatest development at the sensory decussation. Here it was seen as a nerve-like cord, completely surrounded by arching fibres, and having no demonstrable connection with surrounding structures. At the lower third of the olive the column had subdivided into two, and fibres were observed to leave it and radiate in the direction of the corpus restiforme. That these fibres really entered the restiform body could not, however, be demonstrated. Although the exact origin and the destination of the fibres was not determined, the column was regarded by Cramer as identical with that of Pick, and he reached the same conclusion as to its anatomical significance—namely, as an abnormal path for communicating fibres between lateral column and corpus restiforme, and possibly cerebellum.

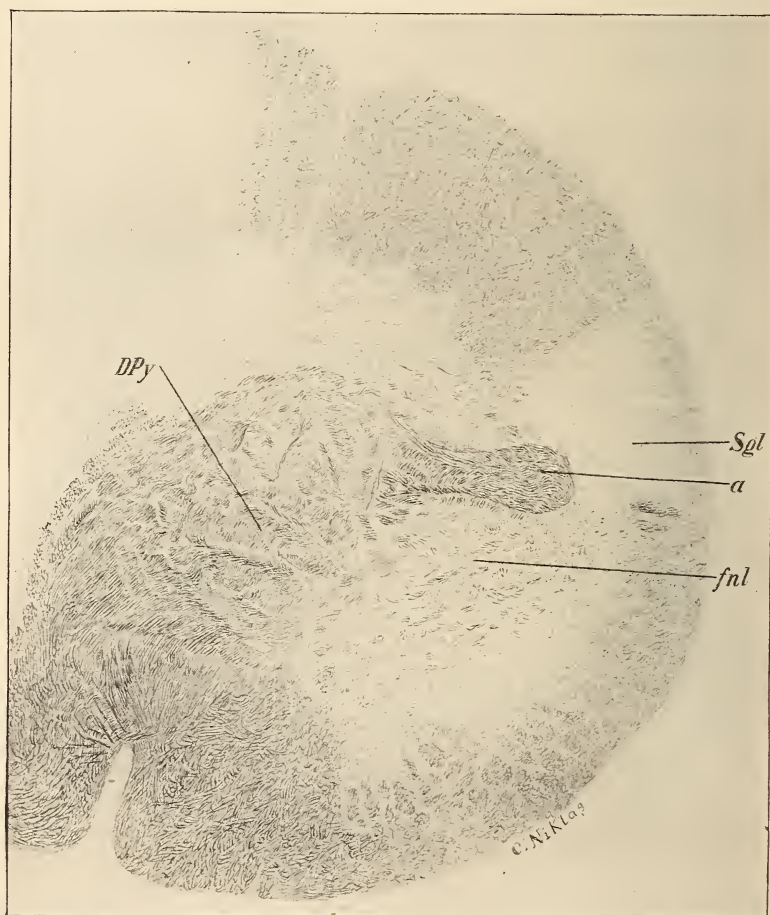
CASE III.—Schaffer,² in the *Neurologisches Centralblatt* for August, 1890, reported the observation of an abnormal fasciculus which arose at the upper level of the decussation of the pyramids, and was situated internal and posterior to the gelatinous substance of Rolando, exactly at the angle which the posterior horn forms with the nucleus funiculus cuneatus. The cross section of the bundle was elliptical, and it was sharply circumscribed anteriorly, internally, and posteriorly by arching fibres. Internally the fibres composing the bundle had a longitudinal direction, while the fibres of the outer half had an oblique course, which, however, tended to become longitudinal as the fibres neared the centre of the bundle. Externally they could be traced to the cells of the nucleus funiculus cuneatus. Although the column was seen to deviate toward the respiratory fasciculus at the level of the lower third of the olive, no communication with this structure was demonstrable.

At a somewhat higher plane the bundle had disappeared, its fibres having entered the corpus restiforme.

Although the location of the bundle is posterior to that of Pick's, and its fibres appear to originate in the posterior instead of the lateral columns, Schaffer identifies the two structures. He regards the bundle as an abnormal path for those fibres which the corpus restiforme receives from the posterior column.

CASE IV.—Kronthal,⁷ in a case of bulbar paralysis, discovered two anomalous unilateral bundles of white fibres lying mesial of the hypoglossus nucleus, near the floor of the fourth ventricle. After thirteen sections had been cut the bundles united and ganglion cells appeared.

FIG. 1.



Transverse section at lower level of decussation of pyramids.

Sgl, substantia gelatinosa. *fnl*, Lateral column; dark fibres separate from those engaged in the decussation, and proceed laterally, to collect at the inner border of the substantia gelatinosa as a distinct round bundle, *a*.

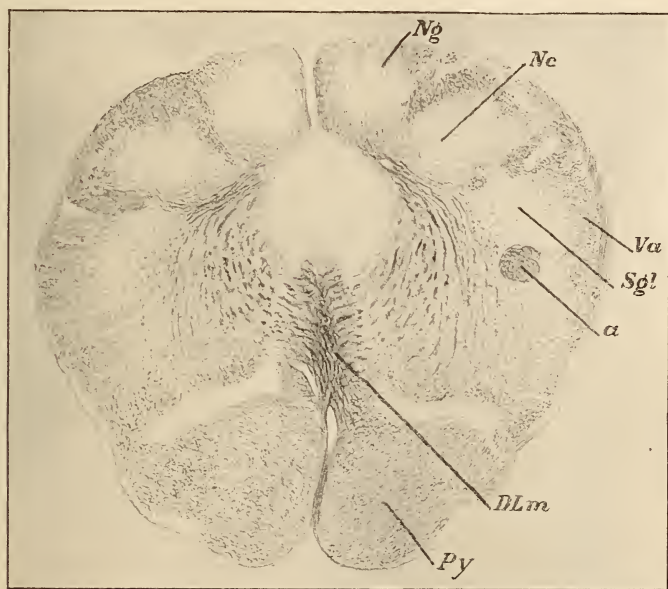
The origin of the bundles could not be determined, and after the appearance of the ganglion cells they could no longer be traced.

CASE V.—In the examination of a human medulla, Van Gieson¹ noticed the presence of two anomalous bundles of white fibres which lay mesial of the hypoglossus nucleus. They were regarded as stray bundles from the posterior longitudinal fasciculus, or as bundles of association fibres for the cells of the hypoglossal nuclei.

CASE VI.—The case of Henle. It is mentioned above, and does not require further consideration.

To these cases I wish to add the following: Case I. is from a medulla cut in series by me in the laboratory of Prof. Obersteiner, in Vienna; Case II., from one cut by Dr. Kornfeld. For permission to publish this second case and for much assistance I am indebted to Prof. Obersteiner.

FIG. 2.



Section from the level of the sensory decussation. (*DLm.*)

Py, Pyramids. *Sgl*, Substantia gelatinosa. *Va*, Ascending root of trigeminus. *Nc* and *Ng*, Nuclei of funiculus cuneatus and gracilis. Bundle (*a*) is plainly visible.

CASE I.—The antecedents of the medulla are unknown. As, however, it had been sent to the laboratory from the pathological department for use as a normal specimen, it may be assumed with comparative certainty that the patient had not died of a disease of the nervous system.

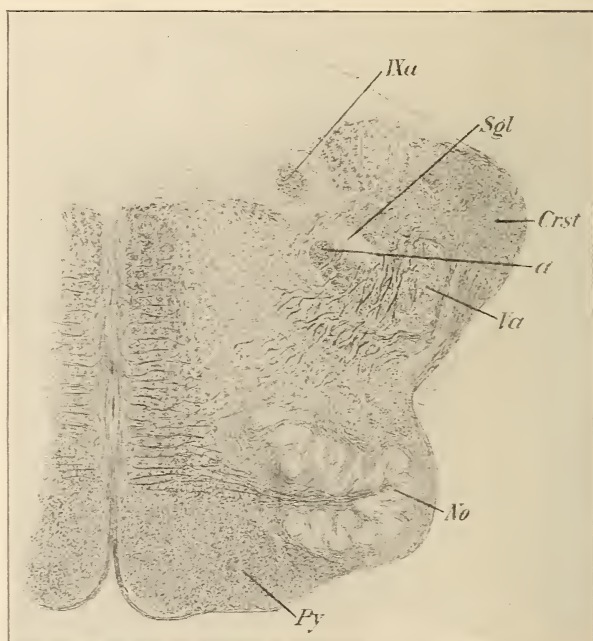
In the subsequent microscopical examination of the serial sections no pathological changes were demonstrable, but two anomalous bundles of nerve fibres were discovered.

The first of these, which I will term bundle *a*, takes origin at the

lower level of decussation of the pyramids. Here, as seen in Fig. 1, a number of fibres (*a*) separate from those engaged in the decussation (*DPy*), and proceed outward and slightly backward to a position anterior and internal to the head of the posterior horn (*Sgl*). They may be readily distinguished from the fibres of the funiculus lateralis (*fnl*) by reason of their greater calibre and consequent darker stain.

In Fig. 2, representing a section at the level of the sensory decussation (*DIm*), these fibres are seen to have united to form a circular, compact bundle, which occupies a position anterior and internal to the substantia gelatinosa (*Sgl*) and ascending root of the trigeminus (*Va*). It is surrounded by fine arching fibres, and has a diameter of about 0.50 mm. No connection between it and the cells of the nucleus funiculus cuneatus (*Nc*), or those of the nucleus funiculus gracilis (*Ng*) is demonstrable. (Compare Schaffer's case.)

FIG. 3.



Section through the upper third of the olive.

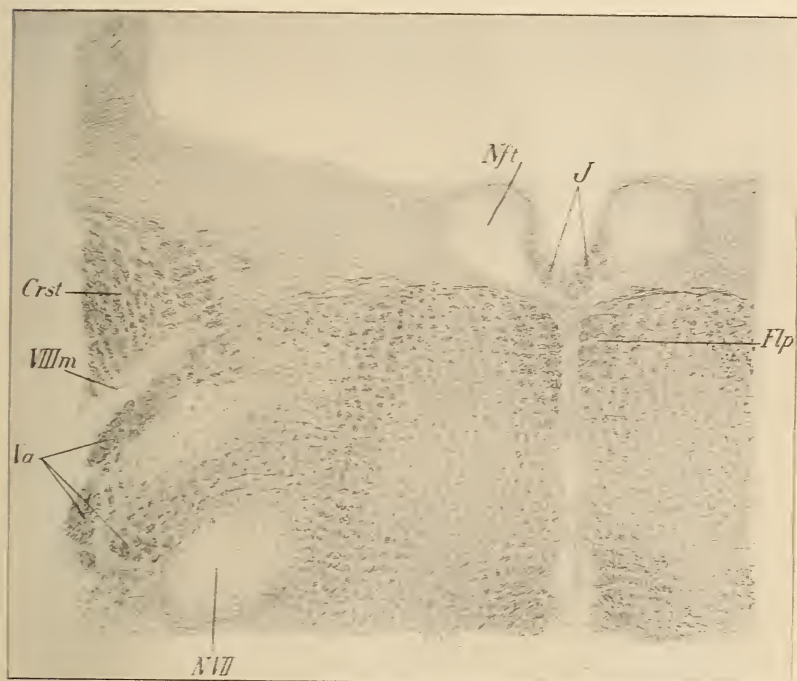
Py, Pyramid. *Crst*, Corpus restiforme. *Sgl*, Substantia gelatinosa. The abnormal bundle, *a*, lies to the mesial side of the ascending root of the trigeminus, *Va*, and is shown to be entirely independent of the ascending root of the glosso-pharyngeal, *IXa*.

In Fig. 3, representing a section of the upper third of the olive, the bundle (*a*) is seen to still occupy its position in proximity to the substantia gelatinosa, and close to the inferior border of the ascending root of the trigeminus. The bundle is somewhat smaller than at lower levels, owing possibly to a more compact arrangement of its fibres, but in general characteristics it is unchanged. The ascending root of the

glosso-pharyngeal (*IXa*), or respiratory bundle of Kraus, may be seen occupying a position dorsal and somewhat internal to the anomalous fasciculus. The entire independence of these structures is, however, well demonstrated. (Compare case of Henle.) No connection between the anomalous bundle and the corpus restiforme (*Crst*) is demonstrable upon this or upon other preparations.

At a somewhat higher level the bundle disappears, its fibres having separated and become lost among surrounding structures. The final destination of these fibres could not be determined, but there is no ground for assuming that they entered the corpus restiforme.

FIG. 4.

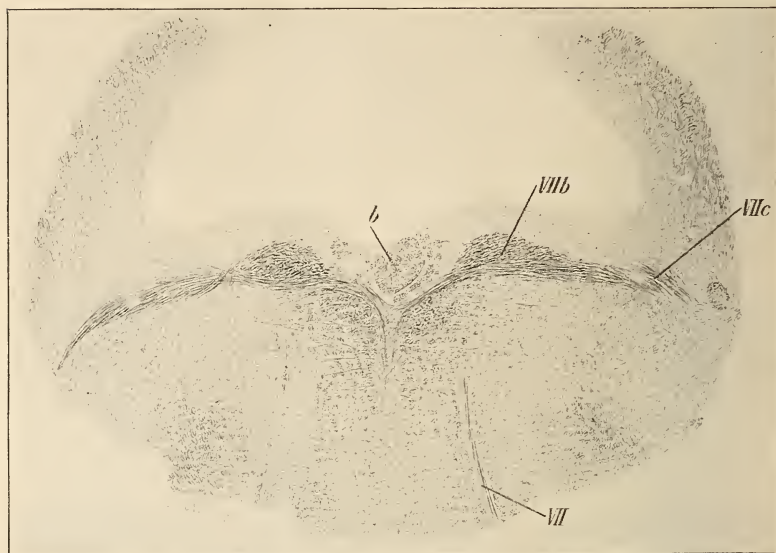


Section a little above the lower border of the pons.

NVII, Nucleus of the facial nerve. *VIII m*, Median root of the auditory. *Crst*, Corpus restiforme. *Va*, Ascending root of the trigeminus. Bundle *a* is no longer to be seen. The second abnormal bundle, *J*, takes origin from the greatly enlarged nuclei funiculi teretes (*Nft*). *Ffp*, Fasciculus longitudinalis posterior.

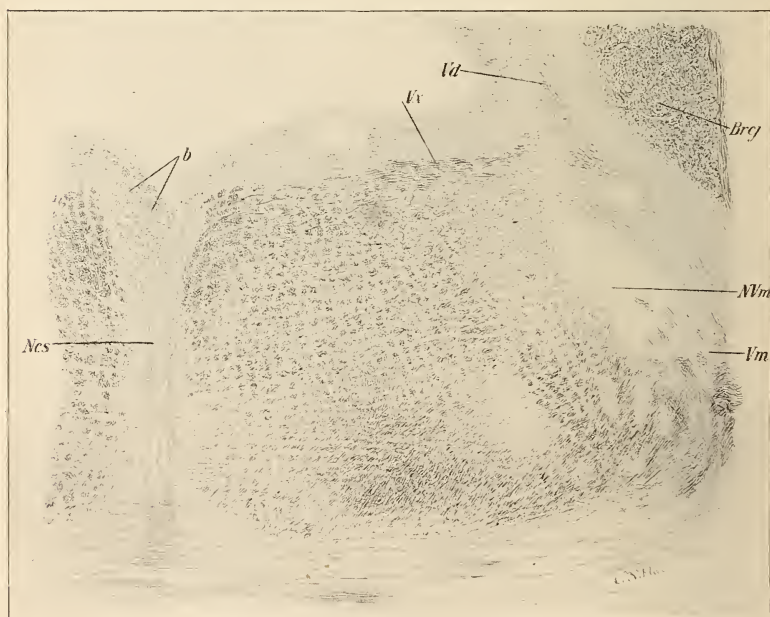
A second anomalous bundle appears in this medulla when we reach the level of exit of the eighth nerve. It is shown in Fig. 4 as a collection of small fasciculi (*J*) which run in a longitudinal direction near the floor of the fourth ventricle. To either side lie the nuclei funiculi teretis (*Nft*). These are enormously enlarged, and give off fibres to the anomalous fasciculi. The ascending root of the trigeminus is seen at *Va*, internal to the median root of the auditory (*VIII m*). The structure at *NVII* is the facial nucleus. Bundle *a* has disappeared.

FIG. 5.



Bend of the knee of the facial (*VIIb* and *VIIc*). *VII*, Abducens nerve. The abnormal bundle, *b*, in the middle line.

FIG. 6.



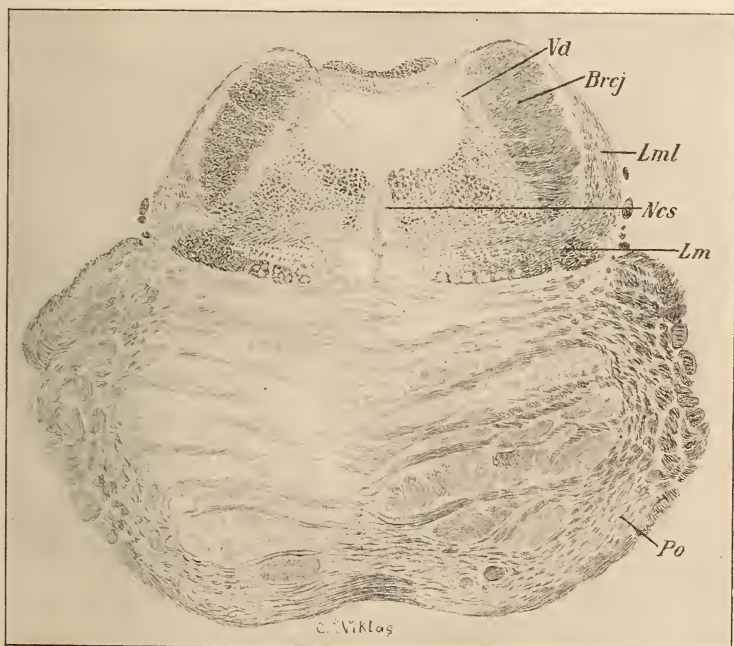
Region of the nucleus of the trigeminus.

NVm, Motor nucleus of trigeminus. *Vm*, Motor root of trigeminus. *Vz*, Crossed root. *Vd*, Ascending root. *Ncs*, Nucleus centralis superior. *b*, The anomalous bundle, which has subdivided into numerous smaller fasciculi.

At the level of the nucleus of the sixth nerve (Fig. 5) the greater number of the anomalous fasciculi have united to form a single large bundle (*b*). This is elliptical on cross section, and lies near the floor of the fourth ventricle, almost in the median line. No communication between the anomalous bundle and surrounding structures is demonstrable at this height. The structure at *VIIIb* is the ascending arm of the root of the facial nerve.

Fig. 6 is taken from a section at the level of origin of the trigeminus. The motor nucleus and the motor root of this nerve lie at *Vm* and *Nvm* respectively, while its sensory nucleus and root lie external to these structures and internal to the brachium conjunctivum (*Brcj*). Its descending root is at *Vd*, and its crossed root at *Vx*. The anomalous structure *b* has subdivided into numerous smaller bundles which lie wedged in between the posterior longitudinal fasciculi. From the anomalous bundles fibres are given off which may be seen running toward the nucleus centralis superior (*Ncs*).

FIG. 7.



Section just below the corpora quadrigemina.

Vd, Descending root of trigeminus. *Brcj*, Brachium conjunctivum. *Lml*, Lateral. *Lm*, Mesial fillet. *Po*, Pons. *Ncs*, Nucleus centralis superior.

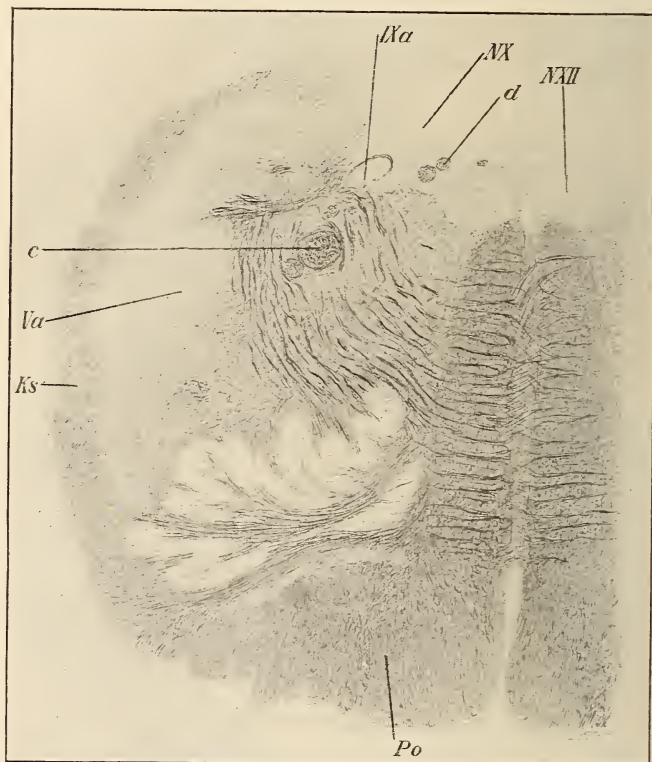
In Fig. 7, representing a section through the pons at the level of exit of the trigeminus, the nucleus centralis superior is seen to be of unusual size. The anomalous bundle has disappeared.

CASE II.—The sections are from a medulla showing marked pathological changes, consisting chiefly in multiple degenerations of nerve

centres and nerve roots in consequence of tabes dorsalis. In its pathological relations this case will be considered by Dr. Kornfeld in a later article. Of especial interest to us is the presence in this, as in Case I., of true heterotopia of white matter, which again manifests itself in the form of multiple unilateral bundles of nerve fibres.

The more important anomalous bundle, bundle *c*, may be first seen at the level of decussation of the pyramids, whence it passes upward in the lateral column, occupying a position to the mesial side of the substantia gelatinosa. It is circumscribed by arching fibres, and has a diameter at its point of greatest development of about 0.75 mm.

FIG. 8.



Section at calamus scriptorius.

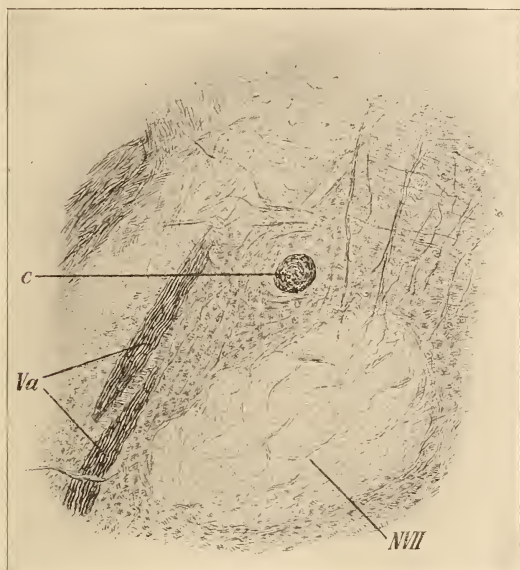
c and *d*, The abnormal bundles. *NXII*, Nucleus of hypoglossal nerve. *NX*, Nucleus of vagus. *Ks*, Lateral cerebellar tract. *Va*, The degenerated ascending root of the trigeminus. *IXa*, Degenerated ascending root of glossopharyngeal.

In Fig. 8, representing a cross section of the medulla at the lower third of the olive, the anomalous bundle is seen at *c*, to the mesial side of the (degenerated) ascending root of the trigeminus (*Va*), and midway between this structure and the respiratory fasciculus (*IXa*). The respiratory fasciculus is made up in this case of degenerated fibres, and it has consequently remained unstained (Pal method). A small sec-

ondary bundle is seen external and somewhat ventral of the bundle *c* (*NXII*). Upon the same side of the medulla, midway between the hypoglossal and the pneumogastric (*NX*) nuclei, run several small anomalous bundles of white fibres (*d*). These are of limited vertical extent, becoming lost laterally at the level of the upper third of the olive.

In Fig. 9, representing a section somewhat above the level of exit of the facial nerve, the abnormal bundle *c* is seen lying midway between the nucleus of the facial (*NVII*) and its emerging root (*Va*). It

FIG. 9.



Portion of a section from the lower part of pons.

NVII, Nucleus of facial nerve. *Va*, Emerging root of facial. The abnormal bundle, *c*, between the two.

is still nearly circular on cross section and remains sharply circumscribed. The secondary bundle has disappeared.

This bundle *c* may be traced to a point high up in the pons, where it finally becomes lost, due probably to a separation of its fibres at different levels, these then becoming indistinguishable from surrounding structures.*

CONCLUSIONS.—Bundles *a* and *c* correspond, in their location near the substantia gelatinosa, and in their general characteristics, with the bundle of Pick. The origin of bundle *a* from the fibres of the lateral column must be regarded as demonstrated. Although the origin of bundle *c* could not be definitely determined, it seems probable from analogy and

* The preparations were all stained according to Pal's modification of Weigert's hæmatoxylin method, and in part double stained by the subsequent use of alum-cochineal.

from the fact that it was first demonstrable at the level of crossing of the pyramids, that its fibres were derived from the same source. The superior termination could not be determined in the case of either bundle. It seems improbable, however, that either ended in the corpus restiforme as in Pick's case. I am much more inclined to the belief that they accompanied the fibres of the tegmentum and reached a much higher point. This seems especially probable in the case of bundle *c*, which could be traced as such to a point considerably above the level of exit of the facial nerve. An explanation as to the physiological significance of either bundle cannot be offered.

Bundle *b* excites especial interest from the fact of its running for the most part of its course as an unpaired fasciculus situated nearly in the median line. The fact that fibres may be seen entering it from the unusually developed nuclei funiculi teretes, and that at a higher level fibres leave it to stream in the direction of the greatly enlarged nucleus centralis superioris, suggests the possibility that it may serve as an abnormal communication between the cells of these structures.

A second, less plausible, explanation would be that the abnormal bundle was a misplaced conductor sonorus (*Klangstab*). This structure may be unilateral, and has been observed running along the floor of the fourth ventricle nearly parallel with its axis, in which case it has always been of unusual size.⁸ The fibres of the conductor sonorus usually end, however, in the vicinity of the cells of the locus cæruleus and not in that of the superior central nucleus, and the explanation would not account for the extraordinary development of the nuclei funiculi teretes, which in this case could be seen actually giving off fibres to the anomalous bundle; hence it may, I think, be rejected as unsatisfactory.

The origin and the termination of the small bundles (*d*) seen running along the floor of the fourth ventricle between the pneumogastric and hypoglossal nuclei could not be determined.

Finally, from a study of our cases we may conclude that the central nervous system possesses, like other organs, a tendency toward occasional misplacement of its elements. This misplacement has, so far, never been observed to occur bilaterally. The most frequent and fairly constant histological anomaly appears to be the presence of a column of white nerve fibres (column *a* and *c*) arising at the level of decussation of the pyramids, and thence proceeding upward, occupying a position internal to the substantia gelatinosa. The fibres of this column may take origin from the lateral or from the posterior column. In certain instances these fibres have been traced above into the corpus restiforme, but this termination has seemed improbable in other cases in which the fibres have apparently extended to a much higher point.

NOTE.—Since writing the above article a communication has been received from Prof. Obersteiner, in which he announces that bundles *a*

and *c* have again been observed in his laboratory. They occurred unilaterally in separate medullæ, in each of which there was marked increase in size of the nuclei funiculi graciles. The *Revue Neurologique*, No. 464, contained a short reference to the fact that an abnormal bundle, corresponding with bundle *a*, has been repeatedly observed by Becterev and his pupil Riklinski.

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THE ISOLATED TYPE OF FRIEDREICH'S DISEASE.

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DR. MACKENZIE'S interesting case recorded in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES for April reminds me that I have a very similar case under my care at the present time, of which the following notes may prove acceptable:

Mabel B., aged thirteen years, first seen in November, 1893. Had then tenderness in knees and ankles, with slight pyrexia. Two days later had precordial pain, and a soft mitral systolic bruit appeared. For this, which remained after the joint symptoms had cleared up, she was detained for some weeks in bed. Toward the end of her stay in bed some jerkiness of the facial muscles, of the head, and of the arm was noticed, which, taken with the rheumatic attack, aroused a suspicion of chorea. The twitchings, however, differed from those of chorea in being shorter in time and less extensive in range than choreic movements are generally. On first getting out of bed, about the middle of December, incoördination of gait was noticed, and ataxia was diagnosticated. She has one brother ten years of age, and two sisters—one fourteen and one three. All are healthy and have good knee-jerks. The mother is a healthy woman; her child-bearing history does not suggest syphilis. The mother's family are said to be all healthy, but one cousin of the patient died from "rheumatism, heart disease, and chorea." The father denies syphilis and exhibits no signs of it, and the family contribute no history of neurosis. The patient has always been a delicate child; had

jaundice at six years, but no illness thereafter until the rheumatic attack mentioned above.

On admission into the Devizes Cottage Hospital in February, 1894, the following was her condition: A pale, thin child, with slightly anxious expression, but cheerful, and no wise emotional. She has never menstruated. She lies in bed with her legs extended, the toes pointed, and the dorsa very prominent—the position resembling talipes equinus. This is equally marked when the pressure of the bedclothes is removed by using a cradle. There is a slight frown of the corrugators which is persistent, and occasional twitchings of the angles of the mouth, of the lips, and of the *alæ* of the nose. There is occasional slight tremor of the head, and jerking of the arms in the direction of the unilateral shrug of the shoulders, or slight extension of the forearm. On making her follow the finger sharply to right or left with her eyes, there is a slight but distinct lateral nystagmus. There is no lateral curvature, but the normal antero-posterior dorso-lumbar curve appears to be exaggerated.

Sensation is normal everywhere to touch, pain, and temperature, except for a patch of impaired acuteness on the outside of the right knee. There have been no "subjective" pains at any time; the special senses are normal, and so is the muscular sense. Voluntary power is good in the legs, as shown in resistance to passive movements. Nutrition of muscles is good, and their tenacity is normal. The plantar reflexes are absent; the abdominal and epigastric are present. There is no knee-jerk nor ankle clonus. Coördination is markedly impaired. She walks with the head carried well forward and the legs widely separated. The gait is ataxic, but not with the high step of locomotor ataxia. She has great difficulty in turning, and staggers as if she would fall in so doing. Romberg's sign present.

Electrical irritability to both currents is normal. The arms appear perfectly normal, but when the hands are quiet they frequently fall into a position of metacarpo-phalangeal extension, with some inter-phalangeal flexion. Her handwriting when compared with that of a year ago shows fine tremors and incoördination, which is absent from the specimens of earlier date.

Speech is not markedly affected, but she does not read so well as she did. The pupils are equal, and react to light and accommodation. The optic disks are normal, and there is no limitation of the visual fields, nor ocular palsy. She complains of giddiness occasionally. She has a systolic mitral murmur.

This may be a convenient place to record the following unpublished examples of the family type of the disease, two of the cases being under my care at present.

CASE I.—Ellen W., aged twenty-one years, unmarried, was admitted into Devizes Cottage Hospital on March 24, 1891, for weakness of the lower limbs. This had been coming on since her eighth year. She remembers that at the first onset she used to stagger in walking, and as the weakness increased she would sometimes fall to the ground. For the last three or four years she has been able to get about the house only by supporting herself by the table or chairs. She complains, too, that during the last twelve months her hands have become more clumsy than they used to be. She is the youngest of a family of eight.

Four brothers are quite healthy. One sister died of "paralysis" (see Ann W., *infra*) at the age of nineteen. Another brother now suffers from paralysis (see Henry W., *infra*). The father is a healthy man, with no appearance of syphilis or alcoholic excess, and is sixty-two years of age. The mother, aged sixty-five years, is blind from double cataract, and for the last two years has been bedridden from rheumatoid arthritis (see genealogical table, *infra*). Nothing in the patient's habits or surroundings has any bearing on her case, but she remembers having had measles when seven years of age. Present condition: an anæmic girl of middle height, well nourished, with a cheerful but vacant expression.

She is easily moved to laughter of a silly and uncontrollable kind. Gets out of bed with difficulty, and cannot stand erect without assistance. When so assisted stands with legs wide apart, and the soles slightly inverted, as in talipes varus. On trying to walk there is extreme incoördination in her efforts.

The feet are drawn forward, raised with difficulty high from the ground, and planted anywhere with a jerk which threatens to throw her down. The toes are over-extended in the effort to stand, and the tendons stand out prominently on the dorsa of the feet. There is a tendency in the hands, when at rest, to extension at the metacarpo-phalangeal, and flexion at the inter-phalangeal joints.

Motor power fairly good in the legs, and apparently unaffected in the arms, as also is the irritability to both currents.

When lying on her back there is talipes equino-varus of both feet, with a shortened foot and over-arched instep. No rigidity on passive movements. Plantar reflex excessive on both sides. No ankle clonus.

No knee-jerk. Gluteal, abdominal, and scapular reflexes present. Pupils equal and active to light and accommodation. Bladder-control normal, but slight impairment of the power of the sphincter of the bowel.

Coördination extremely defective in legs and arms; muscular sense also impaired.

Has never had any pain, numbness, or tingling in her limbs. Cutaneous sensibility everywhere normal to touch, pain, and temperature. Her special senses are all acute. Her optic disks are natural. No trophic signs, but considerable lividity, with coldness of the feet and toes.

There is a well-marked lateral curvature, with convexity to the left. She has frequent twitching of the angles of the mouth when she articulates, which is more marked when she is excited. The attempt to depress the angles of the mouth and lower lips exaggerates this twitching into a clonic spasm of the depressor anguli oris. There is frequent bilateral, conjugate, horizontal nystagmus. No choreiform movements of limbs.

Speech nasal and "clipped," the words brought out with a jerk, and accompanied by a facial contortion.

Her memory is good, and her mental state clear but emotional. Menstruation deficient and bowels sluggish. Other symptoms normal, but she suffers much from palpitation and giddiness.

CASE II.—Henry Thomas W., unmarried, aged twenty-six years, is the brother of the preceding. He was a healthy child till his sixth year, when he had an attack of measles, and, soon after, of scarlet fever.

Within a month after convalescence from the latter he complained of weakness in the legs and began to stagger. About his twelfth year the mother remarked that he used to go about stooping, with his head in front of him. After the twelfth year the lower limbs became helpless, two years later the hands and arms became weak, and since his twenty-second year he has been helpless in them, too. He is now unable to move, except to roll over in bed, and is carried about by his father.

Present condition: Sits in a chair with arms flexed and resting in his lap, and chin depressed on the sternum. His expression would be cheerful but for the constant grimaces produced by the facial muscular contractions, *e. g.*, the occipito-frontalis, each half of which contracts separately, orbiculares oris et oculi, levatores anguli oris, and zygomatici.

The hands are generally, but not immovably, hyperextended at the metacarpo-phalangeal, and flexed at the inter-phalangeal joints. The spine shows a well-marked postero-lateral curvature, with the convexity to the left, and there is a compensatory rotation of the pelvis. The trunk is bent forward, and the recti abdominis stand out as prominent ridges in the middle line anteriorly.

The thighs are flexed on the pelvis, and the legs on the thighs, extension at these joints being impossible. The knees are adducted and in contact, the left overlapping the right. From the approximated knees the flexed legs diverge to either side, so that the feet are widely apart. These latter are in a condition of extreme talipes equino-varus.

All the limbs are much shrunk in size, but what muscle remains is firm. There is no R. D. present, but the faradic and galvanic irritability are both diminished.

The pupil reacts to light and accommodation, and the control over bladder and bowel is unimpaired, but all other reflexes, cutaneous and deep, are abolished.

The speech is markedly affected, the effort to articulate bringing on spasmodic jerkings in nearly all the facial muscles. With these jerkings, and also apart from them, there is frequent oscillation of the eyeballs, but this is slower in time and wider in range than are usually seen in nystagmus. These oscillations are either bilateral (conjugate), or unilateral, and, generally horizontal, are sometimes oblique in direction, but never vertical.

Coördination cannot be tested on account of the crippled movement in the limbs. Sensation is everywhere acute. There have never been lightning pains, nor any dysæsthesiæ. The special senses are unaffected. The disks are normal. Ocular movements are much interfered with by incoördination of the muscles, which sometimes prevents him from fixing his line of vision on any object looked at, strabismus and diplopia coming on in the effort; but though jerky and incoördinate, the movements are normal in range.

His memory is good, and his mental capacity above the average. Slight exertion brings on extreme palpitation, and he has persistent vertigo, which, however, never goes on to nausea or vomiting. Otherwise his general health is good.

CASE III.—Ann W., sister of the preceding, died at the age of nineteen years, and was never seen by me.

Her mother's account is that she was a healthy child at birth, and continued so till her fourth year, when she had measles. Very soon

after recovering from this complaint she became weakly and began to stagger in her walk. Three years later she developed a festinating gait. She could move about, but with difficulty and frequent falls, till her tenth year, after which she had to be carried. At this date she could sew and use her arms, but six years later—in her sixteenth year—the upper arms began to get weak, and this increased steadily till her death. Before her death she appears to have been absolutely helpless as regards movements of arms, legs, head, or trunk. She became unable to speak three days before death, but was able to swallow to the last.

She always had control of the bladder and bowel, never complained of pain, had the use of all her senses, and her mind remained clear throughout.

Her feet and hands in the later stages had the same deformity that her brother's now have.

REMARKS.—The isolated case is of interest—if time should confirm the diagnosis arrived at—on account of the quick progress of the disease and the early stage at which the diagnosis was possible. This had to be made between locomotor ataxia, cerebellar tumor, and chorea. The exclusion of the two former was possible on the line adopted by Dr. Mackenzie; that of chorea was more difficult.

The similarity of the early stages of Friedreich to chorea, which has already misled such observers as Ladame, Moxon, Ormerod, and others, was here increased by the antecedent rheumatism and the presence of a systolic murmur.

The facts which led me, in the face of such odds, to conclude in favor of ataxia were the following:

1. *The distribution.* The hands were unaffected except to the slight extent discernible in writing; the arms were only involved to the extent of a slight muscular twitch; the legs, which showed no twitching whatever, were the seat of extreme incoördination.

It is usual in chorea to have both legs the seat of incoördination, while the hands show neither involuntary movements nor weakness.

2. *The nature of the twitchings.* (a) These could not well be described as clonic spasms, if the latter be taken to mean increased as well as involuntary muscular action. They were more of the nature of muscular tremors, being slighter in range and slower in time than choreic spasms. (b) They affected either single muscles (levator anguli oris), or a part of a muscle (anterior portion of trapezius or part of triceps); never co-ordinated groups of muscles (supinators, adductors, or rotators), as generally happens in chorea. (c) They were not increased by emotion or by voluntary effort in this case.

(In the cases of Henry and Ellen W. the muscular twitchings were increased by effort or emotion, however; probably this occurs in the later stages of the disease.)

3. *The gait.* This was distinct from the shuffling, irregular gait of chorea. The head was kept well forward; the arms held apart from the

body, as if to balance; the feet straddled widely to obtain a larger base; the pace was quickened, as if to call momentum to the aid of equilibrium; the frequent stagger was not due to jerkiness of the muscles of the leg or the trunk throwing the body off its balance, as in chorea, but suggested the reel of vertigo or of intoxication.

4. *Static equilibrium.* I have never seen Romberg's sign typically present in chorea. A sudden muscular contraction may disturb the child's balance, but in the interval between the spasms equilibrium is maintained. In Friedreich's disease the sway which precedes a fall is evidently due to a persistent interference with the motor side of the co-ordinating mechanism, and not to a momentary disturbance of it, as in chorea.

5. *The nystagmus.* While unilateral and irregular spasm of the ocular muscles is met with in chorea, it is doubtful if nystagmus—bilateral, symmetrical, and rhythmical—ever occurs. I have never seen it recorded in connection with chorea.

6. *The state of the feet.* The gradual onset of talipes with inco-ordination in a child should always raise a suspicion of Friedreich's disease, pointing as it does to structural cord change. Dr. Bristowe, I am aware, mentions a case of chorea (Fagge's *Medicine*, vol. i. p. 734, footnote) in which there was a tendency to talipes equino-varus. If the description be read, however, it will be found to accurately describe the condition present in H. W.'s case, which is undoubtedly one of ataxia. With all deference to a great physician, one may be pardoned for doubting whether the same disease was not present in both cases.

As regards the family cases, one point of interest in connection with them is the sequence of the disease, in two cases immediate, to attacks of measles. A similar sequence occurred in Dr. Mackenzie's case. Acute fevers are, of course, recognized as etiological factors in the genesis of the disease, but I have not had time to consult the literature of the subject as to the preponderating influence of measles in this respect.

Remembering, however, the rôle of measles as a neurosis-producer,¹ one would not be surprised if the chronic cord change of Friedreich's disease frequently owned such an attack as a factor in its etiology.

The distortion of the hands and feet in all these cases points to this being a pretty constant feature of the disease. In the hand, in the later stages, the deformity resembles the claw-hand of progressive muscular

¹ The sequelæ reported include disseminated myelitis (Barlow, *Lancet*, ii. 1884), cerebro-spinal meningitis (Cheadle, *ibid.*), various palsies (Ormerod, *ibid.*, and Colcott Fox, *ibid.*, i. 1887), acute ascending paralysis (Negrie, *ibid.*, ii. 1887), peripheral neuritis (Monro, *ibid.*, i. 1894), and numerous others referred to by Monro, and recorded by Ross and Bury, and by Kop.

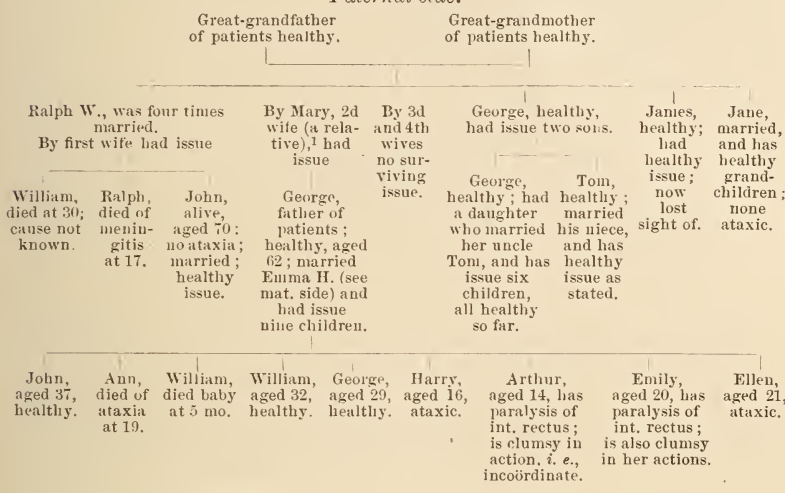
I have myself notes of four cases of non-tubercular meningitis following measles, without ear complications.

atrophy, or of ulnar lesion. In the foot the early stage resembles that of paralysis of the dorsi-flexors. The later stages appear to be generally a condition of extreme talipes equino-varus. The extreme and almost absolute fixation of head, trunk, and lower limbs, in the second of the family cases (Henry W.), by the preponderant action of the flexors throughout the body, produced a clinical picture of distortion following paralysis, such as one seldom sees surpassed in nervous disease.

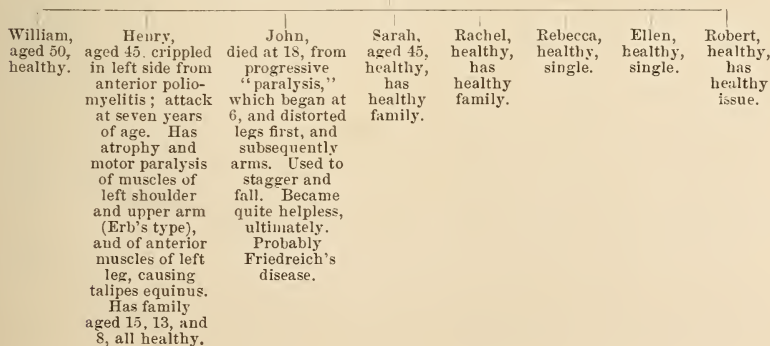
The genealogical table of this family suggests several matters of interest. One is the consanguinity existing between the grandparents of the patients, a degree of consanguinity, however, which could hardly have been greater than that between the uncle and niece in a collateral branch of the family.

GENEALOGICAL CHART OF THE W. FAMILY.

Paternal side.



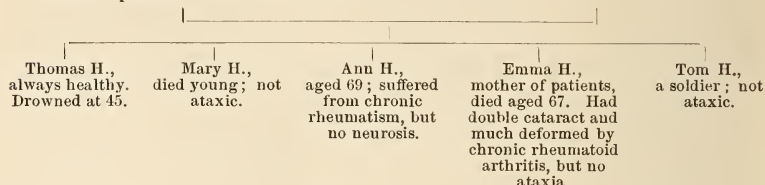
¹ The antecedents of this second wife, though of great interest, cannot be unearthed. It is certain that she was a relative of her husband, Ralph, but the degree of kinship cannot be ascertained. She had one sister and two brothers—all healthy. The sister, name unknown, had a son named Robert W., before her marriage. She subsequently married and had no further issue. The son, Robert W. (a cousin of George W., the father of the recorded patients), married a healthy woman, and had issue as under, the children being second cousins of the patients above.



Maternal side.

Paternal great-grandfather of patients died at 80; always healthy.
 Paternal great-grandmother, died at 70; also healthy. Had issue, Samuel H., grandfather of patients.

Maternal great-grandfather and grandmother; both healthy. Had issue, Maria H., grandmother of patients.



In the latter case no ataxia has so far developed in the issue of the marriage. The disease, however, reappears in the descendants of the second wife's sister, and this appears to point to the family to which the second wife and her sister belonged as being the source of the taint. Thus, of seventeen second cousins—the descendants of these two sisters—hereditary ataxia appears in four, ocular and other neuroses in two, and acute atrophic paralysis in one. Rutimeyer has recorded (*Virchow's Archiv*, 1883) a similar association of anterior poliomyelitis with Friedreich's disease, occurring in a branch of the Blattner family reported by him.

NOTES ON THE OBSERVATION OF MALARIAL ORGANISMS IN CONNECTION WITH ENTERIC FEVER.¹

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THE possibility of typhoid and malarial fever manifesting their symptoms at one time in the same individual has afforded a fertile subject for debate for many years, with the result that the belief in the simultaneous action of the two infections has been gradually losing advocates. The theory originally advanced by Woodward, that a "typho-malarial fever" exists as a specific and independent disease, other than a typhoid fever made irregular by admixture with malarial poison, has been more and more abandoned by competent clinicians, as it subsequently was by Woodward himself, although it is occasionally revived in the South and Southwest in discussions upon the continued fevers of the South; especially in newly settled localities whose success as health resorts is closely connected with a belief in the entire absence of typhoid fever.

An exceedingly interesting paper was read before this Association six

¹ A paper read before the Association of American Physicians at the American Medical Congress at Washington, on May 30, 1894.

years ago by Dr. Johnston,¹ in which he summarized data in regard to the relation of typhoid fever to fevers of malarial origin, based upon replies to questions sent to 350 physicians residing along our Atlantic and Gulf seaboard. Dr. Johnston's contribution to this subject is familiar to us all, but I desire to refer briefly to one or two of its features. The research elucidated very strikingly the variations in type of enteric fever depending upon locality.

Two of the questions propounded were the following:

1. "Do you recognize in your practice a distinct type of continued fever which is neither malarial nor typhoid, or one which is a compound of both—a typho-malarial fever?"

2. "Do you think that the typhoid fever which you see is modified by malarial infection?"

The answers to the first question conform to geographical distribution, the existence of a "typho-malarial fever" being very generally denied in the Northeastern States, and affirmed by rather more than one-half the answers received from eastern North Carolina, South Carolina, Georgia, and Florida.

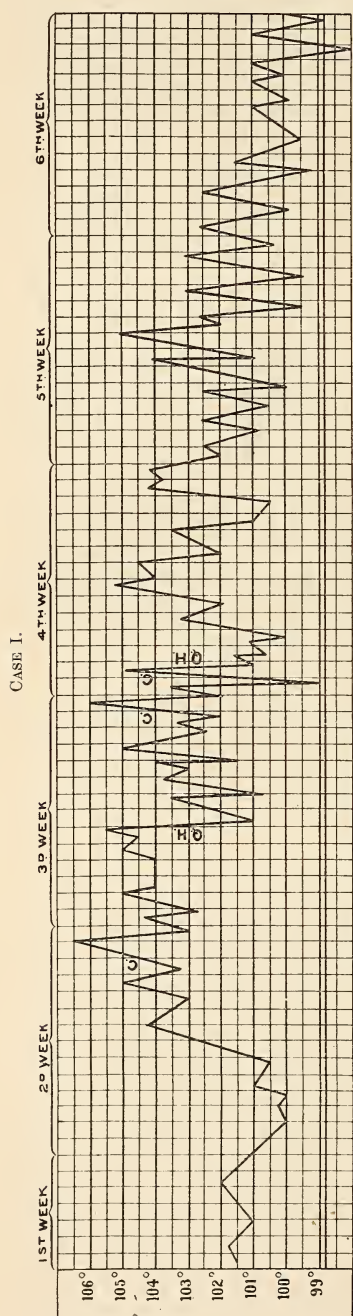
In answer to the second question, some stated their belief that in certain localities in the South "all the forms of fever seem to be more or less complicated with malaria, so much so that it is almost impossible to treat it successfully without the use of quinine in considerable quantities." Others living further to the northeast affirm that "there are no mixed continued fevers."

The belief is, I think, almost universal that typhoid fever, as observed in New York, is uncomplicated by malarial infection, and that quinine, except as a tonic in convalescence, is worse than useless in its treatment. For this reason the following cases, seen in New York last summer and autumn, are of unusual interest.

CASE I.—The patient, J. McN., male, a native of the United States, forty-three years of age, was admitted to the Presbyterian Hospital, New York, on August 18, 1893. He denied having had ague, and gave no previous history of interest excepting that for the past twelve years he had indulged at intervals in the opium habit, taking of late as much as twenty grains per diem. For three days he had been ill with headache, vertigo, prostration, epistaxis, and slight cough, with mucous expectoration. On admission, his appearance suggested typhoid fever, and he was treated accordingly by the Brand method of cold tub-bathing. There were slight enlargement of the splenic area of dulness, great prostration, diarrhœa, and a typical typhoid tongue—dry, coated on the dorsum, with thin red margins and swollen papillæ. There was continued fever which lasted for seven weeks, and during this period the patient developed the following symptoms: a genuine typhoid eruption, there being some forty distinct rose spots on the abdomen and chest, which appeared in

¹ "On the Geographical Distribution of Typhoid Fever in the United States; its Relation to Fevers of Malarial Origin," etc. W. W. Johnston: Trans. Assoc. Amer. Phys., 1888, vol. iii. p. 8.

successive crops; hemorrhages from the bowels, of which there were four or five of considerable amount, tympanites, bronchial catarrh, slight



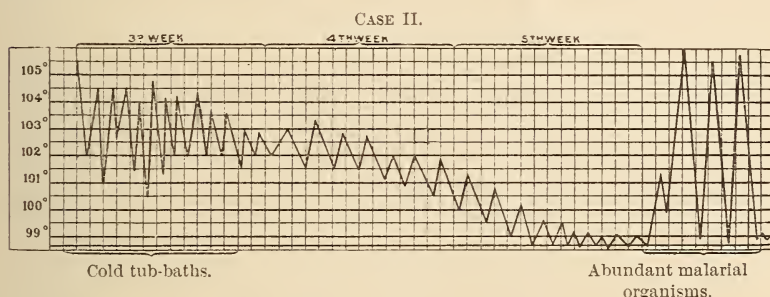
C. C. = chills.

albuminuria with granular casts, semi-stupor and delirium, subsultus, great prostration and emaciation, and the facies of the typhoid condition. On the thirteenth day of the illness there was a severe chill, lasting about three-quarters of an hour, and so violent that the patient shook the bed. It was accompanied by a rise of temperature to 106.6° F., but there was no sweating. During the third week two other chills occurred of equal violence. As the first chill took place before the hemorrhage and also before the eruption became decisive, and as there was nowhere evidence of suppuration, it appeared possible that there might be an error in the diagnosis, and the blood was carefully examined for the malarial plasmodium. It was found in exceptionally large numbers invading the red blood-corpuscles and also independent of them. When the next chill and exacerbation of temperature occurred quinine was given hypodermatically with the effect of reducing the temperature 4.5° (105.5° to 101° F.). This treatment was several times repeated, and on one occasion, at the end of the third week, the temperature was temporarily reduced from 106.4° to 99° F. No more chills occurred after the beginning of the fourth week, but the use of quinine was continued by the mouth, and the bathing, previously interrupted by the hemorrhages, was resumed. The patient made a good recovery, and after fifty-five days in the hospital was discharged, cured.

I regret that no examination of the stools for typhoid bacilli was made, but in view of the distinct eruption, epistaxis, intestinal hemorrhages, and tympanites, in con-

nection with all the other symptoms, there can be no reasonable doubt that typhoid fever was present, and repeated examinations of the blood proved the presence of the malarial organisms on each occasion. (There was nothing in the character of the stools to indicate dysentery.) I have never seen a more complete picture of enteric fever as regards all the symptoms, excepting the chills and irregular temperature curve.

CASE II.—The patient, J. J., an Irish laborer, thirty years old, was admitted to the New York Hospital on July 25, 1893. Two weeks before admission to the hospital he had had five or six chills of considerable severity, accompanied by nausea, vomiting, slight diarrhoea, and fever. He had complained also of severe frontal headache. On admission, the spleen could be palpated half an inch below the free border of the ribs, and two or three dozen rose spots were found upon the chest, abdomen, and back. The Ehrlich reaction was present. There were tympanites and slight albuminuria with decided prostration. The tongue was dry, coated on the dorsum, with thin red margins and prominent papillae.

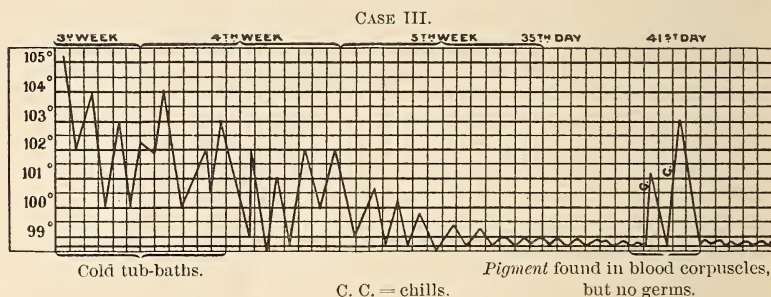


The patient was treated by cold tub-bathing without medicine. He received in all thirty baths. The fever ran as typical a typhoid course as one often finds when cold "tubbing" is employed; the maximum temperature was 104.5° F., and it became normal upon the thirty-first day. The Ehrlich reaction disappeared. The temperature remained below 99.4° F. for several days, and on the thirty-seventh day suddenly rose to 106° F., and was accompanied by profuse perspiration. There were chills and high fever (105.5° F.) on each of the two successive days at the same hour, and Dr. Ferguson, the pathologist of the hospital, who examined the blood for me, found malarial organisms in abundance in the blood. From the continued giving of quinine the patient had no more chills or fever, and in a few days he was discharged, cured.

There can be no question that this was a genuine case of typhoid fever. The course and duration of the fever, the headache, diarrhoea, enlarged spleen, the appearance of the tongue, the facies and hebetude of the patient, and the distinct rose spots all combined to make the case very typical. The following case is very similar to the preceding:

CASE III.—The patient, W. L., male, U. S., a laborer, twenty-seven years old, was received at the New York Hospital on the nineteenth day of his illness. His temperature then was 104.5° F.; respiration, 24;

pulse, 100. There was a distinct eruption of rose spots on the abdomen and thorax, a red, dry tongue with swollen papillæ at the tip, great prostration, and the facies of enteric fever. The spleen was palpated half an inch below the free border of the ribs. The patient was treated by cold tub-bathing, receiving twenty-one baths in all. He made a good recovery, and after ten days of normal temperature he was allowed the freedom of the ward. He was about to be discharged as cured on



the forty-first day, when he had a severe chill, lasting half an hour, followed by fever and sweating. The chill was repeated the next afternoon at about the same time, also with increased temperature. Quinine was promptly given and the blood was not examined until the patient had received twenty grains. No malarial organisms were then found, but abundant malarial pigment granules were contained in the blood cells. Under the continued use of quinine, the patient recovered three days later.

In the first case reported the plasmodium became active during the height of the typhoid disease. In the second and third cases the malarial symptoms remained latent (although the plasmodium must have been already present) until the force of the enteric infection had been completely expended, when they assailed a body weakened by a fever of considerable duration. This is of interest in view of the well-known fact that in those who are subject to malarial paroxysms the malarial poison often takes advantage of lowered conditions of the system produced by fatigue, exposure, inanition, constipation, etc. It may be noted that neither of these patients recalled having had previous attacks of ague. With regard to the first case, it is to be observed that the typhoid fever, at first very mild, was immediately greatly aggravated by the malarial complication. The patient's condition was so reduced by it that his death seemed certain. The sudden reductions in temperature which took place bore a definite relation to the giving of quinine, and not to the hemorrhages. The chills also were not connected with the hemorrhages.

The advocates of typho-malarial fever as a distinct disease usually emphasize the absence of rose spots as invariable.¹ Others, who deny

¹ Squire: Epidemiol. Soc. of London. Lancet, January 8, 1887, p. 73.

the possibility of the coexistence of malarial and enteric fever, account in various ways for the chills and sweating in cases presenting a similar clinical picture to those above reported, they not having found the malarial plasmodium in the blood.

Thus, Bouveret¹ reports four such cases in which he believed the modified symptoms were due to a slow and irregular elimination of toxic material, a large volume of which is sometimes thrown into the blood at once; and Fränkel² reports a similar case in which he thought the symptoms might be due to a thrombus in a mesenteric vessel, with suppuraton and possibly miliary abscesses in the liver.

Professor Osler, in a recent number of the *Johns Hopkins Hospital Reports*, vol. iv. No. 1, mentions three interesting cases in which malarial fever was present with the plasmodium within a few months of the occurrence of enteric fever and once within a few days, but as the result of his experience he says: "There was no case with the characters of the two diseases so blended that it seemed a compound or hybrid malady, nor was there an instance in which the manifestations of the two diseases were concurrent."

It is not well to draw hasty conclusions from a very limited number of cases, but there is a kind of evidence which does not need to be multiplied to be convincing; and it seems to me, from the observations of the few cases herewith presented, that while it is unwise to accept the term typho-malarial fever as indicating a third form of disease, which is neither typhoid fever nor malarial fever, it cannot be denied that the two latter diseases may coexist.

Case I. certainly proves that they may do so, and this in a part of the country in which this form of double infection is most unlooked for, and the other cases, although perhaps less striking, are at least corroborative.

A STUDY OF ONE HUNDRED AND THIRTY-EIGHT CASES OF POTT'S PARALYSIS.

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THE matter of this paper has been gleaned from all the printed sources available, and from an original study of one hundred and thirty-eight cases, one hundred and five of them being collected from the literature of the subject, the rest, thirty-three in number, being all the cases treated at the Boston Children's Hospital before 1891, of which a fairly full account could be obtained. For permission to use this last material I

¹ Lyon Médical, June 5, 12, 1892.

² Lyon Médical, June 19, 1892.

am indebted to Drs. E. H. Bradford and H. L. Burrell, of the surgical staff of the hospital.

PATHOLOGY.—The work of Michaud,¹ Erb,² Courjon,³ Elliot,⁴ Gowers,⁵ and others, has made the usual course of the process clear.

In the vast majority of cases the caseous osteitis of the bodies of the vertebræ extends back, involves first the posterior common ligament, which becomes ulcerated, and then the external surface of the dura, making a pachymeningitis externa. The tumor so formed projects into the vertebral canal, presses on the cord, sometimes forcing the cord against the laminae, and thus sets up an interstitial myelitis of greater or less extent, from which ascending and descending degenerations may take their origin.

Macroscopically, the dura is seen to be thickened, now in one or two spots, again like a ring, again generally. Regularly, however, it is the outer surface which shows a change; the inner surface remains unaffected. The pia and arachnoid appear normal. The nerve roots are frequently found compressed by masses of exudation in the inter-vertebral foramina. The cord in early paralysis may show on gross examination absolutely no change in size, color or consistency, or it may look pale or red at the point of compression, and show some softening; later it may show hardening instead. The shape may be irregular, and the size may be reduced even to one-fifth of the normal calibre. Changes above and below the point of compression are not usually to be seen with the naked eye, except by the help of staining fluids.

Microscopically, one sees in the dura outside the normal inner layer a fibrous layer containing many leucocytes; the outer edge of this merges into a mass of caseous pus. At a late stage the dura may be seen to be made up of a mass of fibro-cartilaginous plaques. If compression has lasted some time the cord shows at the site of the lesion a considerable increase and thickening of interstitial connective tissue, a thickening and fatty degeneration of the intima of the vessels, and throughout the cross section many granular corpuscles, globules of myelin, and corpora amylacea; the gray matter may be distinguishable from the white only after staining, and then with difficulty; the axis cylinders are swollen or broken down; in the central gray matter the ganglion cells are swollen, vacuoles are formed, and there is here and there pigment deposited. As the seat of the caries is in the bodies of the vertebræ, and as the anterior portions of the cord are usually held close to the posterior surfaces of the vertebræ, while the posterior portion is five or six lines from that face of the canal, the meningitis is ordinarily anterior, and the myelitis first appears in that part of the cord. The myelitis may, however, be more or less unilateral, and may vary in extent from a slight infiltration to a complete destruction of the cord. There may be no changes except at the point of compression, or, above and below,

destructive processes may go on, and these, though they may affect the gray matter to a variable extent in either direction, are especially apt to cause alterations in the white matter. Above, degeneration⁶ usually follows the posterior columns—the direct cerebellar tract when the lesion is above the lumbar enlargement, the ascending antero-lateral tract of Gowers, and high up the fasciculi graciles, even to the medulla, while below, degeneration goes on in the pyramidal tracts, direct and lateral, even to the cauda equina. In these consecutive lesions the microscope shows, in the gray matter, the same changes, though less advanced, that are seen at the point of compression, and in the white matter interstitial proliferation of connective tissue and degeneration of nerve fibres. This degeneration is not generally uniform on the two sides, and is, to a certain extent, variable in the path followed. Such is the customary pathological process, but there may also rarely be pressure paralysis in which the pressure is exerted by bone, as by an acute angle of bone, by a sudden dislocation of one vertebra on another, by an obtuse angle of bone over which the cord is tightly stretched, or by a sequestrum⁷ detached within the canal; or, again, the pressure may be caused by an abscess^{8,9} encroaching on the canal.

Moreover, the paralysis may be due, as Elliott⁴ has pointed out, to an obstruction of the blood supply, in which case there may be no myelitis, only an acute œdema, and recovery may be very rapid.

Such obstruction is easy, as the vessels are small, do not anastomose freely, are exposed on the surface of the cord, and enter through foramina easily blocked by exudation.

Finally, it is possible, though most rarely does it happen, for inflammation to spread to the cord, either by contiguity through dura and pia or along the nerve roots, and there to set up a myelitis by extension.

In contrast to the class of cases showing paralysis without lesion of the cord, there are those cases which show compression and atrophy of the cord without paralysis,¹⁰ and complementary to these last are the recoveries from paralysis; for in these, examination at times finds well-marked sclerosis existing, while the functional activity of the cord is not lessened. The closeness of the cord to the anterior wall of the canal, and the facts that the disease of the bone is usually in the bodies of the vertebræ and that the tracts conducting motor impulses are more superficial than those transmitting sensory impulses, are reasons why the paralysis is usually motor before it is sensory. In some cases, however, there is relatively great destruction of the cord in the posterior columns, due to pressure on the laminae, and in these there may be recovery of motion and sensation but permanent ataxia.

Showing the proportion of the causes of paralysis, Poore¹¹ says that autopsies in 66 cases show a cord compressed 53 times by thickened meninges; 4 times by dislocation; once each by enlargement of odontoid,

by an acute angle of rapid formation, by dead bone, by a blunt angle over which the cord was stretched, by diseased bone which had given way, and three times by an abscess which had burst into the spinal canal.

Of the 35 deaths in the cases studied, records of autopsies have been found in only 22, and of these only 8 were complete, that is, included a microscopical study of the cord. In those examinations, made by various observers, there was reported a pachymeningitis in 5; signs of myelitis in 4; softening with hemorrhagic infiltration in 1; sclerosis in 3; secondary degeneration, ascending and descending, in 5, and neuritis in 2 cases.

In every case the cord was found affected, and in most cases the meninges.

In tabulating the 14 macroscopic examinations, it is found that an alteration of the shape or size of the cord, a flattening or a lessening, is the commonest lesion, occurring 8 times; softening is reported 6 times, while sclerosis was evident only once, a pachymeningitis was present in 5 cases, and it is clearly stated in two instances that the cord looked normal.

SYMPTOMATOLOGY.—(a.) This cannot be prefaced better than by the classical clinical history of Pott:¹⁷

The patient "at first complains of being very soon tired, is languid, listless, and unwilling to move much or at all briskly; in no great length of time after this he may be observed frequently to trip and stumble, although there be no impediment in his way, and whenever he attempts to move briskly he finds that his legs involuntarily cross each other, by which he is frequently thrown down, and that without stumbling; upon endeavoring to stand still and erect without support, even for a few moments, his knees give way and bend forward; when the distemper is a little further advanced it will be found that he cannot, without much difficulty and deliberation, direct either of his feet precisely to any exact point, and very soon after this both thighs and legs lose a great deal of their natural sensibility, and become perfectly useless for all the purposes of locomotion.

"Some are rendered totally and absolutely incapable not only of walking, but of using their legs in any manner, others can make shift to get about with the help of crutches, or by grasping their thighs just above the knees with both hands; some can sit in an armed chair without much trouble or fatigue, others cannot sit up with any help; some retain such a degree of power of using their legs, as to be able to shift their posture when in bed; others have no such power, and are obliged to be moved on all occasions.

"The first return of the power of motion in the limbs is rather disagreeable, the motions being involuntary and of the spasmodic kind, principally in the night, and generally attended with a sense of pain in all the muscles concerned.

"In the milder kind of case, the power of voluntary motion generally soon follows the involuntary.

"The knees and ankles by degrees lose their stiffness, and the relaxation of the latter enables the patient to set his feet flat upon the ground; the certain mark that the power of walking will soon follow."

(b.) *Prodromal period.* There may or may not be a prodromal period characterized by sensory disturbances.

There may be pain, varying much in degree; it may be girdle-like, or

there may be persistent neuralgias at any spot, usually of abdomen or legs. Possible also are paræsthesiæ, as tinglings or sensations of heat or cold, hyperæsthesia and anæsthesia; this last is usually in spots. There are said to be sometimes herpetic or bullous eruptions over areas supplied by nerves from affected regions.²

(c.) *Paralysis of motion.* The paralysis which is characteristic of myelitis varies from a slight weakness of a few muscles, not to be noted without close observation, to a complete loss of power of most of the muscles of the body, so that the patient lies prostrate.

Though usually a paraplegia, the paralysis may involve all parts of the body supplied by spinal nerves, or it may be a monoplegia,¹⁸ or a hemiplegia;¹⁹ either, too, may develop after a time into a paraplegia; there may be a brachial paraplegia, and later this may extend and involve the legs.²⁰

In severe cases the abdominal and respiratory muscles may be affected. The legs are very often affected unequally.*

Of 59 cases reported by Gibney,²¹ 24 (40.6 per cent.) had complete paralysis, and of these 4 had also incomplete cervical paraplegia. Of 59 cases analyzed by Taylor and Lovett,²² 32 (54.2 per cent.) had complete paralysis; 3 had paralysis of the arms. Of Myers' ²³ 218 cases, paralysis affected the arms in 7. Of the 138 cases studied for this paper, 61 (44 per cent.) had complete paralysis, and 26 had more than a simple paraplegia. Of the 256 cases thus available for comparison, 117 (45 per cent.) had complete paralysis of the limbs affected.

In some cases the arms are first paralyzed, while the legs are free. This may be due to the fact that the lesion is at the level of the cervical enlargement, and in this place first attacks the anterior roots for upper extremities; in this form of palsy muscular atrophy and absence of reflex actions form a characteristic feature;^{24 25} or if the lesion is in upper part of cervical cord, the motor paths in the antero-lateral columns which belong to the upper extremities may be attacked first; in this case reflex actions would be present. In a few cases, the compression being limited to one-half the cord has caused a hemiplegia with crossed anæsthesia, a typical unilateral lesion.¹⁹

(d.) *Paralysis of sensation.* "Some impairment of sensation is found in all Pott's paralysees, but it is usually so slight as only to be recognized by the most delicate tests, and for a short time."²⁶

Very frequently, however, sensation in paralyzed parts is decidedly dulled, usually some time after the muscular weakness is noted, and there may be almost complete anæsthesia of all the body below the site of compression. This is significant of a very extensive transverse myelitis.

* There have been cases where paralysis of arms followed paralysis of legs, when the lesion was in the dorsal spine. This may be due to an ascending myelitis, which is not rare, or to ascending degeneration of the lateral columns, which is quite rare.

There may be, too, hemi-anæsthesia, or areas of anæsthesia ; De Jonge²⁷ describes a case with increased sensibility in the paralyzed parts.

There may be, though usually there is not, pain of a constant, heavy, aching character all over the paralyzed limbs. There may be also paræsthesia and hyperæsthesia, all of these sensory symptoms being due to pressure or myelitis of the posterior columns.

Generally tactile sense disappears first, then the sense of temperature, and last the sense of pain. Michaud¹ quotes a case in which there was paralysis of sensation and not of motion, and there are several cases in which the sensation was found dull before muscular weakness was noted.

Taylor and Lovett²² found out of 59 cases 15 (25.4 per cent.) with incomplete sensory paralysis.

Of the 138 cases, 71 (51.4 per cent.) had some notable impairment of sensation.

(e.) *Spasms and contractures.* In the prodromal period there may be twitchings of various muscles, due to irritation of the anterior nerve-roots ; but generally at first the paralyzed muscles are completely relaxed, quiet, and soft ; the joints also are relaxed and make no opposition to passive motion. In the later stages, with the advent of secondary degeneration in the cord, the flaccid muscles may become tense and rigid ; usually at first the legs are extended stiffly and the feet are held in slight equino-varus ; later a change comes on, slowly or suddenly, sometimes while the patient is asleep ; the thighs become flexed on the pelvis, adducted, the legs flexed on the thighs, and the feet frequently take the position of calcaneo-valgus. If the limbs are extended again they frequently flex in a jerk without any apparent cause.

Sometimes there is present what is called "clasp knife" rigidity (for example, if, when the knee is flexed, the leg is gradually straightened, it moves smoothly and easily, till full extension is nearly reached, and then it suddenly becomes rigidly extended, and a good deal of force is required to bend the knee again).

At first abnormal positions can be readily passively corrected, but later contractions set in, and the legs become fixed in the position adopted.

Of the 138 cases 19 are noted as having rigid muscles.

(f.) *Bladder and rectum.* In severe cases either the bladder or the rectum, or both, may be affected ; usually at first there is some difficulty in micturition—slowness in starting the stream—but later there is true incontinence.

The anal sphincter may be paralyzed and the contents of the bladder and rectum may be involuntarily evacuated consciously or unconsciously. Incontinence may result some months after symptoms of complete paraplegia have existed, apparently from downward extension in the cord, and this incontinence may last for years, and yet the patient finally improve and obtain entire volitional control over the bladder again.

In other cases the resulting cystitis is an important factor in causing death.

Taylor and Lovett's 59 cases furnish 8 examples of paralysis of bladder or rectum, and the 138 cases show 63 examples.

(g.) *Reflexes.* The condition of the deep reflexes is important in diagnosis.^{28 29} They are regularly exaggerated unless the seat of the lesion be the lumbar enlargement, in which case they are absent. The slightest tap on the patellar tendon, the lightest pressure on the sole of the foot, even a tap on the bone or fascia, or belly of muscle, will in many cases call forth a vigorous contraction of all the muscles of the leg, and sometimes be followed by a similar contraction of the muscles of the other leg. Even the evacuation of the bladder or rectum is said sometimes to be sufficient to call forth a clonus of the limbs.

The cutaneous reflexes are sometimes exaggerated, so that pinching the skin will cause a violent reflex clonus; again, are not to be found; and still again, are unaltered.

Gibney¹⁵ quotes cases in which pressure over the inner side of the lower third of the thigh would cause sudden flexion of the thigh on the pelvis and of the leg on the thigh, followed in a few minutes by the same motion on the opposite side.

Bastian²⁸ says that cases show that "deep reflexes are abolished if there is a complete transverse lesion, *i. e.*, when there is a complete loss of sensibility as well as of voluntary power."

(h.) *Trophic and vasomotor changes.* Trophic changes are said to be uncommon unless the cervical or lumbar enlargement is involved, which may occur from secondary degeneration; but if the paralysis has existed any considerable time one frequently finds a notable degree of atrophy of the legs, together with some coldness, occasional lividity, and generally a dry, inelastic, scaly skin. There may be localized œdemas, sweatings, alterations of temperature,¹⁵ and sometimes lesions of the joints secondary to lesions of the cord.

Roser³⁰ has seen three cases of spontaneous dislocation of the hip brought about by the reflex motions of Pott's paralysis; the luxation was behind, gradual and painless. In severe cases bedsores are frequent. Of the 138 tabulated cases, 20 had marked wasting of the limbs and 2 had profuse sweatings noted.³¹

(i.) *Medullary symptoms.* When the upper cervical cord is compressed Charcot has noted paralytic myosis or spastic mydriasis from paralysis or irritation of the corresponding paths in the cervical medulla.

Respiratory and gastric disturbances, vomiting, difficult swallowing, persistent hiccough, and retardation of the pulse have been met and are attributed to implication of the vagus, spinal accessory, or phrenic nerve; according to Michaud,¹ general convulsions may occur from compression of the upper cord.

(j.) *Sexual disability.* Pott speaks of a characteristic loss of the power of erection. In the series under examination priapism and loss of sexual power are mentioned, the former occurring three times and the latter twice.

(k.) *Time in Pott's disease at which paralysis appears.* The paralysis may come on as a diagnostic symptom of Pott's disease before the latter has been otherwise made manifest, or it may come on when spinal disease has existed for years and when to all appearances the process has subsided into quiescence.

Taylor and Lovett say paralysis occurs on an average about two years after the beginning of the disease. Out of 40 cases it came promptly after a fall in 4 cases; in 8 cases it came within one year from the beginning of the disease; in 16 cases within two years; in 4 cases within three years; in 3 cases within four years; in 1 case in five years; 1 in nine years; 1 in eleven years; 4 in fifteen years; and 1 in twenty-eight years.

Gibney says the average duration of spinal trouble before paralysis is about three years, though the time has been as short as four and a half months and as long as eleven years. Myers puts the time at from a year to a year and a half.

The writer has found the time in question in 130 cases as follows: Under one year, 62; one to two years, 18; two to three years, 14; three to four years, 10; four to ten years, 12; ten years or over, 14; longest time, twenty-one years.

From this it is apparent that in nearly 48 per cent. the time is less than a year, and that in more than 72 per cent. of the cases the time is less than three years.

(l.) *Duration of increase of paralysis.* From the first note of weakness to the maximum of paralysis attained there may be less than a day or there may be several months, but perhaps oftenest a few weeks.

In 44 cases the time was noted with the following result:

Under one month, 19 cases; one to two months, 12; two to three months, 4; over three months, 9.

(m.) *Duration of paralysis.* The duration of the attack may be a few weeks or it may be a lifetime; usually it varies from a few months to a few years. Pott¹⁷ put the time at from two months to two years. Gibney¹⁵ in 13 cases of paresis found a duration ranging from four weeks to twenty-two months. From a study of 218 patients, Myers²³ gives an average duration in cervical cases of twelve months, in upper dorsal of nine and a half months, in lower dorsal of six months, and in lumbar cases of eight months. He also finds that the duration is several months less when the paralysis begins in a patient under treatment.

Taylor and Lovett²² give as the average duration twelve months, but when paralysis comes on while the patient is under treatment an average

duration of only seven months. In their 36 cases the durations were as follows: One case, six years; 2, three years; 5, two years; 7, one year; 4, six to twelve months; 8, six months; 9, two to four months.

The duration to recovery or death of 108 cases was as follows: Under six months, 37; six months to one year, 28; one to two years, 25; two to three years, 11; three to four years, 4; four or more years, 3. Twelve of these cases were under treatment before paralysis began. Of these 12 the duration was under six months in 6; six to twelve months in 5; and from 1 to two years in 1 case. The shortest paralysis with recovery noted by the writer is seven weeks and the longest four years.

(n.) *Recurrences.* A few cases have more than one attack, and there are instances of three, and even of four attacks.

Taylor and Lovett found in 59 cases recurrences in 6; Myers in 218 cases, recurrences in 18; Gibney in 58 cases, recurrences in 8. The intervals between these recurrences varied from a few weeks to several years.

Of the 125 patients studied 9 had two attacks, 1 three attacks, and 1 four attacks. The intervals between these attacks varied from a few weeks to fifteen years.

(o.) *Termination.* There are three terminations—recovery, death, and permanent paralysis.

1. Recovery is usually gradual, and frequently lasts months. After some time of absolutely no change in the patient's symptoms it is found that a few motions can be executed by the paralyzed parts at times, then there is a permanent increase of power in those parts; the sensibility improves and generally becomes normal before entire power over the muscles is established; control of the bladder is regained; and, last of all, usually months after the patient believes himself well, the tendon reflexes become normal.

2. Death may result from progressive myelitis with its attendant cystitis, bedsores, diarrhoea, pyæmic fever, and exhaustion, or the patient may yield to tuberculosis or be cut off by some intercurrent disease.

Gibney in 13 deaths found 6 from myelitis, 2 from tuberculosis, and 5 from other diseases.

Taylor and Lovett in 59 cases found 5 deaths—2 pneumonias, 1 phthisis, 1 opium habit, and 1 acute cerebral meningitis.

The list here studied furnishes 27 deaths with known causes; 5 were the direct result of myelitis, 8 were the result of tuberculosis or amyloid disease, 4 the result of operation for the relief of the paralysis, and the remaining 7 came from acute affections not bearing any relation to the spinal disease.

3. A permanent paralysis may be slight in amount—simply noticed as a weakness—or it may be a paralysis with contractures, and the patient get about, if at all, with great difficulty. In the last case, how-

ever, the general health may be excellent and the condition without danger to life.

FREQUENCY.—The proportion of cases of spinal caries that become paralyzed varies greatly with the clinic of the one making the estimate.

The 2657 cases of Pott's disease from the following table give 404 cases of paralysis, or about 15 per cent.

Authority.	Cases of spinal caries.	Cases of paralysis.	Per cent.
Gibney ¹⁵	295	62	21
Taylor and Lovett ²²	445	59	13
Mohr ³²	72	5	7
Drachman ³³	166	22	13.6
Sayre ³⁴	109	38	35
Shaffer ²³	1570	218	13.9

In Gibney's cases, in 189 cases of cervical or upper dorsal disease, paralysis occurred 59 times, and in 106 of lower dorsal and lumbar there was paralysis only 3 times. Taylor and Lovett's 59 cases are distributed thus: 1 cervical, 7 cervico-dorsal, 37 dorsal, 7 dorso-lumbar, 4 lumbar, and 3 undesigned. Of Sayre's 38 cases, 2 were cervical, 1 dorso-cervical, 32 dorsal, 1 dorso-lumbar, and 2 lumbar. Shaffer's 218 cases are 16 cervical, 12 cervico-dorsal, 145 dorsal, 19 dorso-lumbar, 18 lumbar, and 1 unspecified.

In the present list the cases, so far as known, are apportioned as follows: Cervical, 15; cervico-dorsal, 10; dorsal, 85; dorso-lumbar, 6; and lumbar, 3. It is evident that nearly all the cases of paralysis result from lesions in the cervical or dorsal vertebræ, and that that locality of caries is, as Gibney says, the great predisposing cause of paralysis.

DIAGNOSIS.—Recognition of the beginning of paralysis is usually possible from the fact that it is generally preceded by an increase of pain in the abdomen or legs and by an increase in the deep reflexes of the knee and ankle. The diagnosis is made by establishing the existence of Pott's disease.

Trauma of the spine and pressure on the cord from other causes may give the same symptoms. Such other causes are cancer and sarcoma of the spine, small exostoses of the vertebræ, meningeal tumors, hypertrophic cervical pachymeningitis, aneurism, gumma, hydatid cyst, hemorrhage or abscess in canal, tumors of the cord, and spontaneous transverse myelitis.

When Pott's disease exists, the attendant asthenia or a double psoas contraction may be confounded with paralysis, but the latter has increased reflexes, and the former not.

PROGNOSIS.—In a broad way the prognosis of Pott's paralysis is good, *i. e.*, it tends to recover entirely. Taylor and Lovett in 47 cases, the results of which are known, find 39 recoveries (83 per cent.). Gibney

finds in 58 cases 29 recoveries (50 per cent.), and Myers reports 55 per cent. recovered in 218 cases.

Counting those 12 cases as "result not known," in which the paralysis has been in existence less than a year and still continues, the list here made gives 126 "result known" cases, of which 78 are recoveries (62 per cent.).

The Children's Hospital cases, considered separately, give out of 28 cases 18 recoveries (64 per cent.).

In making the prognosis in any particular case certain factors enter which may be considered in detail.

1. *Treatment of patient before paralysis.* If the patient has been under treatment, the prognosis is somewhat better. Taylor and Lovett give 100 per cent. of recoveries in such cases, but in the present list are 15 such cases, with only 10 recoveries (67 per cent.).

2. *Duration of paralysis.* The maximum time with recovery is, as before stated, four years, and of the 14 cases whose paralysis lasted more than three years only 4 recovered. In the cases whose paralysis lasted less than six months, there were 18 recoveries; 21 recovered in from six months to one year; 20 in from one to two years; and 11 in from two to three years. From this one may infer that a patient's recovery is more apt to come in the second six months than in the first, that it is nearly as likely to take place during the second year as during the last half of the first, but that the prognosis grows rapidly worse during the third year, and that after three years there is comparatively little hope.

3. *Time from beginning of spinal disease to beginning of paralysis.* Of 62 cases whose paralysis began within a year, 27, or 43.5 per cent., recovered, while of 68 whose paralysis began more than a year after the spinal disease, 44, or 64.7 per cent., recovered. In other words, if the process is acute and advancing rapidly enough to bring on a paralysis early, the prognosis is worse than if slower changes compress the cord at a later stage.

4. *Age of patient.* Of 15 cases over forty years old when paralysis began, only 5, or 33 per cent., recovered (the oldest cured was at beginning of the paralysis fifty-four years), while of 76 patients under fifteen years, 48, or 63 per cent., recovered. (The youngest cured was at the beginning of the paralysis twenty-two months old.)

Of 47 between fifteen and forty years, 24, or 51 per cent., recovered. Other things being equal, therefore, the prognosis betters with the youth of the patient.

5. *Severity of the paralysis.* Of the cases with simple paresis of the affected muscles, 65.6 per cent. recovered, and 15 per cent. died, while in those with complete paralysis of the affected parts, 36 per cent. recovered and 46 per cent. died; 38 per cent. of those with marked

sensory affection got well and 38 per cent. died; 41 per cent. of those with paralysis of sphincters recovered and 32 per cent. died.

Clearly, then, the lighter the paralysis the better the prognosis, but with complete paralysis the addition of sensory or vesical palsy does not make the chance of recovery materially less.

6. *Location of lesion.* Cases other than cervical and dorsal are too few to form a basis for estimate. The percentage of recovery in paralysis of cervical origin is 25, while in that of dorsal origin it is 55.

7. *Rigidity or contractures of limbs.* Of the 19 cases in which rigidity was mentioned as a prominent symptom only 5 recovered.

8. *Marked wasting of limbs.* Of 20 cases affected by considerable atrophy, 8 recovered.

9. *Character of spinal deformity.* The kyphosis, as was noted by Pott, is apparently not of great importance in prognosis, but a large gradual curve, as the writer found in thirty cases examined, claims the largest per cent. of recoveries.

10. *Sex.* As to the liability of paralysis in Pott's disease, it is interesting to note that of the 125 patients, 77 are males and only 48 females. The per cent. of recoveries among the men is 52 and among the women 61.

11. *Part of body involved.* When there is more than a paraplegia present, the prognosis is made correspondingly worse—7 recoveries out of 26 cases; while in simple paraplegia there were 71 recoveries in 112 cases.

12. *Recurrences.* The cases studied give no reason for thinking the prognosis in a second attack any worse than for a first attack.

13. *Intercurrent disease.* Bradford has noted a case of recovery from paralysis during an attack of measles. The writer has seen two cases of intercurrent typhoid; in one, as the fever progressed, the paralysis grew worse till the patient was powerless, and then lightened with convalescence; the other, a fairly severe case of paralysis, was quite unaffected by the fever. He has seen also one case of amyloid disease which died paretic; in this there was marked improvement in the paralysis during the two months immediately preceding death.

Proportion of deaths. Taylor and Lovett find in 59 cases 5 deaths, 3 still paretic. Gibney finds in 58 cases 13 deaths, 14 still paretic. In the 138 cases there were 34 deaths, 26 still paretic.

General summary of prognosis of paralysis. There is not a symptom characteristic of the paralysis that is of fatal import. Recovery has taken place even from threatening asphyxia.³⁵

There is hardly a condition of the paralysis so severe as to deny the possibility of recovery. Recovery has occurred from paralysis of arms and legs, anaesthesia, and incontinence.

A child less than ten years old, with dorsal caries and paresis of legs for less than one year, will probably recover.

An adult paralyzed more than four years will probably not recover.

The three most important elements in prognosis, in order of their importance, are (*a*) the duration of the paralysis; (*b*) the severity and extent of the paralysis; (*c*) the age of the patient. The real index to the severity and extent of the paralysis is the completeness of the paralysis of the muscles of the affected limbs.

TREATMENT.—All authorities agree that the back should be put at rest; therefore confinement in bed, with a spinal support, either jacket or brace, must be the first measure adopted.

In certain cases this enforced rest, perhaps aided by extension and counter-extension, is sufficient for prompt cure, but in more cases cure is a matter of gradual improvement extending over months. In all cases rest should be persisted in till the return of the use of the limbs is well established. Relief in a few days or weeks has been given by opening an abscess connected with the spine, and operation is to be recommended if there is an abscess present. Subsequent treatment is expectant: the number of drugs given outside of tonics is large enough to prove that no one is eminently satisfactory.

Gibney³⁶ is confident that potassic iodide in doses to the limit of toleration reduces the average duration of the paralysis by months. He says: "Begin with gr. x, t. i. d. p. c. in mineral water, best Vichy; increase dose daily by gr. x till stomach is intolerant." "Keep up as big a dose as the stomach will bear."

Bromide, ergot, silver nitrate, strychnine, physostigma, belladonna, have all had earnest advocates, the last especially, for removing neuralgias which precede paresis. Outside of drugs, electricity is recommended especially by the neurologists, and Erb² says that a moderately strong galvanic current applied in a stable way to the point of lesion has been of service, and that he has never seen it do harm. Gibney,³⁶ however, quotes cases where electrical treatment has, he says, caused relapse or delay in cure. The cautery is a favorite with some, but has objections for private practice. Althaus³⁷ says that this treatment is good when only the membranes are affected, useless if the cord is involved.

Poore³⁸ gives directions how to cauterize without causing notable suffering even in children, and cases are quoted in which a single cauterization has brought about an almost immediate cure.

In the same line of treatment are mentioned blisters and local applications of hot water and ice.

Mitchell³⁹ urges the claims of suspension, saying: "It lets the patient get out of bed; it distinctly alters the pathological curve of the spine; it gives ease and relief to aches; it seems to act with more speed than other plans, and when these have failed it gives a new resource."

Medicated baths are mentioned by one writer with the remark that they may be dangerous. Tenotomy¹ has been done to relieve the con-

tractures of paralysis. With reference to all the methods of treatment beyond rest, it is to be noted that as the paralysis tends to a cure which sometimes comes suddenly and unexpectedly, a careful estimate of the relative value of different remedies is difficult, and certainly from this series no conclusion can be drawn decidedly favorable to any mode of treatment beyond rest. Some cases, however, do not get well, and even grow worse very rapidly; for such there has been since 1882 another treatment proposed, resection of the vertebral laminæ at the site of the lesion and relief of pressure. The operation has as yet been done only a few times, but there have been some remarkable successes and several fatal results; improvement when noted has frequently proved temporary. At present Bradford⁴⁰ says: "The status of operation is that it offers hope to some cases that would otherwise be hopeless, while it has no place in treatment till conservative measures have been faithfully tried."

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A CLINICAL AND EXPERIMENTAL STUDY OF URÆMIA.¹

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URÆMIA is a systemic intoxication, the phenomena of which are mainly nervous in origin, brought about by an accumulation in the blood of substances which it is the function of the kidneys to excrete, either by an over-production of such substances or by the failure of the kidneys to eliminate them owing to a lack of secreting power.

ETIOLOGY.—While it is probable that an appreciable number of cases of uræmia originate with kidneys in an apparently normal state structurally, yet Bright's disease is by far the most important factor in its development.

Though the total number of cases developing in the course of chronic Bright's disease is greater than that in the acute form, yet the percentage of uræmias in the latter is decidedly higher than in the former. In acute Bright's, most notably in scarlatinal nephritis, the onset of uræmia may occur at any time, even almost coinciding with the earliest positive symptoms of the kidney lesion.

In chronic nephritis uræmic symptoms will most frequently develop late in the disease, when the secreting substance of the kidney has been almost totally destroyed, or if occurring earlier, the attack will very frequently be found to coincide with an acute exacerbation of the chronic kidney lesion. This may be traceable, it may be, to exposure, exhaustion, or errors of diet. The influence of diet upon these exacerbations, and so upon the production of uræmia, is a subject that requires much more careful and systematic investigation than it has hitherto received, for while such influence is scarcely to be questioned, still no definite rules can be laid down governing it. It is a very significant fact that the simplest diet, of which milk is the best example, will obviate almost

¹ This essay was awarded the Boylston Prize, 1893, for the best dissertation on a Clinical and Experimental Investigation of Uræmia.

By an order adopted in 1826, the Secretary was directed to publish annually the following votes: 1. That the Board do not consider themselves as approving the doctrines contained in any of the dissertations to which premiums may be adjudged. 2. That in case of publication of a successful dissertation, the author be considered as bound to print the above vote in connection therewith.

The Boylston Medical Committee is appointed by the President and Fellows, and consists of the following physicians: Robert T. Edes, M.D., President; Samuel G. Webber, M.D.; H. P. Bowditch, M.D.; Frank W. Draper, M.D.; J. Collins Warren, M.D.; Edward S. Wood, M.D.; William F. Whitney, M.D., Secretary; F. H. Williams, M.D.

wholly these accidents. Of errors in diet, alcoholic excesses stand easily at the head. Such a notable number of cases of uræmia occur in the course of acute alcoholism that there can be no question of the relation of cause to effect. Many symptoms of acute alcoholism are probably uræmic, even though there may be no pronounced kidney lesion demonstrable. The alcohol probably plays a dual rôle: first, by its irritant action upon the gastro-intestinal mucous membrane it causes an increased production of toxic substances; and second, after its absorption, its direct effect upon the kidney must be such as to perceptibly limit elimination.

Many cases occurring in the course of chronic nephritis are indeterminate in etiology. Particularly is this true of the interstitial form when uræmia comes on suddenly, without any indisposition or apparent cause. In the parenchymatous form serious uræmia will most likely occur very late, and with fatal result; or if earlier, it is almost always traceable to an exacerbation of the nephritis, and may be recovered from. Occurring in the course of Bright's disease, uræmia is usually preceded or accompanied by a decreased secretion or total suppression of urine. Too much attention, however, cannot be drawn to the fact that well-marked and characteristic uræmia may occur while the quantity of urine is not at all disturbed. Further, it is to be noted that there may be uræmia while the urine is not at all albuminous, even when post-mortem examination has disclosed well-marked disease of the kidneys.

Again, if during the course of a chronic nephritis there be an intercurrent acute febrile affection, this often determines the onset of uræmia.

In addition to actual diseased conditions of the kidneys, there is a class of cases where, though there be a healthy state anatomically present, yet functionally they are inactive through changed urine pressure, and the same result is attained as by disease. These cases are the uræmias occurring during pregnancy or other conditions which interfere with the free outflow of urine. Here often two factors may be recognized, one of them a somewhat diseased condition of the kidney, yet it is undeniable that in some of the cases only the other factor obtains—obstruction of the ureters and damming back of the urine on the kidneys. Several such cases have been recently reported by Nash.¹ While here many of the eclampsias are unquestionably the concomitants of definite kidney lesions, as is evidenced by the accompanying urinary condition, yet there are some occurring with perfectly normal urine, in which the kidney can only be functionally inactive. This is rendered the more probable, seeing that in the lower animals, where there can be no pressure by the pregnant uterus upon the ureters, eclampsia is unknown. There is a class of cases where the symptoms are not so clearly uræmic, and even if uræmic, where the etiology is certainly more obscure than in

¹ Lancet, London, 1892, vol. ii. pp. 477.

the foregoing. These are the so-called uræmias of the acute infectious diseases. The condition is most marked, and has received the greatest attention in cholera, but is also encountered in typhus and typhoid fevers, and probably rarely in some other diseases. Here the symptoms are so exactly similar to the uræmia occurring in Bright's disease that they are commonly referred to as uræmic. Of course, in some of these cases there is actual disease of the kidneys, and here the condition is really one of uræmia due to loss of secreting power of the kidneys, the direct consequence of their diseased condition. But, when the kidneys are structurally almost perfect, the uræmia, if it really be uræmia, must be due to excess of poisonous matters in the blood, either on account of an actual over-production or else to lack of elimination by the kidneys, either purely functional or due to the changed condition of the blood, the result of the cholera. These cases, it seems to us, instead of being considered uræmias, would better be classed among the toxæmias, the toxins producing them being the products of the specific bacteria causing the diseases. However, they may really be uræmic, and due to an over-production in the blood of the uræmic poison, seeing from the consideration about to be entered upon that such a condition seems to be possible.

In health, with the kidneys structurally perfect, as is evidenced by the urine, it is possible to have uræmia develop, which is probably, at least in part, to be explained by the assumption of an over-production of poison.

CASE: Man, aged forty-three years; always in fairly good health, with the exception of rather marked dyspepsia. Without cause or warning he was suddenly seized with a general convulsion, attended with entire loss of consciousness. When first seen, some hours later, he had recovered from the convulsion, but was delirious. It was impossible to attract his attention, or elicit any coherent answers to questions. For twenty-four hours there was no urine voided, and a catheter passed into the bladder found it empty. At the end of this time the secretion of urine was slowly re-established. The first urine that passed, three ounces, had a specific gravity of 1033, contained no albumin and no casts, but an excessive amount of uric acid. As the urine increased in quantity the specific gravity was slightly lowered, but it never fell below 1028. There was constantly present an excess of uric acid, but at no time could either albumin or casts be detected by a most careful examination. The delirium persisted for a week, gradually subsiding. Since then, there has been no return of any such symptoms. Repeated examinations of the urine for four years after the convulsion, failed to show either albumin or casts, nor has there been any other evidence of renal lesion. The urine has always been above the average normal specific gravity, and has generally contained an excess of uric acid. No examination of the urine was made previous to the convulsion.

Now, while here were presented none of the ordinarily accepted causes of uræmia, the case is explicable on no other grounds than that

the symptoms were uræmic, or at least due to a poison acting similarly to the uræmic poison and producing similar results. It is probable, looking at the pronounced dyspeptic symptoms and the marked excess of uric acid, that there was an excessive production of poison in the digestive or assimilative apparatus. It is impossible that the symptoms could have been due to any disease of the central nervous system, for a most careful analysis of the case has failed absolutely to point to any such disease. Two other cases of probably similar character have been under observation, but the symptoms have been much less marked.

Such conditions as these must not be confounded with uræmia arising in the course of Bright's disease, when the urine is non-albuminous, the possibility of which has been mentioned above. It is perfectly well known that the interstitial form of chronic Bright's disease may exist without the presence of albumin in the urine, and that uræmia may arise in such a condition; but it is apparently not recognized that such a state of affairs may obtain equally in the parenchymatous form. Dr. Leys¹ has drawn attention to this fact with the citation of the following case:

A man, aged fifty-one years, of alcoholic habits, had been at the Philadelphia Hospital in 1885 with nephritis, from which he apparently recovered and was discharged. On March 21, 1892, he became suddenly insane, and was readmitted. On admission he was deeply stuporous, could be aroused to say "yes" and "no;" legs œdematous; breath distinctly urinous in odor; pupils strongly contracted and immobile; temperature 99.4° F.; urine had a specific gravity of 1016 and contained neither albumin nor casts. In the next twenty-four hours the patient roused somewhat, temperature fell to normal, pupils became normal, and thirty-six ounces of urine was passed, containing no albumin. In the following twenty-four hours he grew perfectly rational, but had no recollection of preceding events; the œdema disappeared and the urine rose to forty-five ounces. November 25th, the urine fell to thirteen ounces, and all the bad symptoms except the œdema reappeared. Then the patient made a slight rally; but the urine, which still showed no trace of albumin, did not increase. November 27th, the temperature rose to 100° F., and the patient died of pulmonary œdema. Urine drawn from the bladder after death showed albumin distinctly, and two granular casts were found after a prolonged search. Post-mortem examination showed the kidneys large (right weighed eight and one-half ounces, left ten ounces), capsules distinctly adherent, the surface and section a light, mottled pink, cortex much thickened and pale, pyramids congested. The heart showed fatty degeneration, but was not hypertrophied. The brain showed no lesions except œdema of membranes.

SYMPTOMATOLOGY.—For clinical study uræmia may be divided into the acute and chronic forms. The conditions under which these forms appear are the same, and no sharp line can be drawn between them.

¹ Philadelphia Hospital Reports, vol. ii.

The symptoms are mainly the same, differing only in severity. At any time during the course of chronic uræmia exacerbations may supervene as violent as any of the acute cases. So that, in considering any symptom it must be premised that it is limited to neither form. The acute form is usually sudden in its onset and well marked in its course. It is most likely to be met with in acute, or in the exacerbation of chronic, Bright's disease. The chronic form arises more gradually, and, lasting indefinitely, is present toward the end of a chronic kidney affection. It may be recovered from, and an indefinite interval of comparative health be enjoyed, or more usually it leads surely to death, its close being marked by a violent outbreak. The symptoms may be distributed among the nervous, the gastro-intestinal, and the cardio-pulmonary systems; but symptoms of one type may be intermingled with those of another, or at any time one type may be replaced by another.

NERVOUS SYSTEM.—One of the commonest, and certainly the most marked, manifestations is convulsions, sometimes preceded for a short time by headache, vertigo, nervousness, muscular twitchings, nausea, or vomiting, and sometimes with an abrupt onset. They resemble exactly epileptic convulsions, lacking the aura and the initial cry. Lasting a variable time, they are followed by somnolence or mental heaviness, and may recur indefinitely. Sometimes the convulsions follow each other in rapid succession till they end in death. Or, a convulsion may terminate in coma, persisting till death or eventually clearing up. More rarely, instead of coma, delirium or actual mania may follow a convulsion. Usually general, the convulsions may be unilateral, or even limited to a single member; here consciousness need not be lost, or only for a period so brief as not to be clearly recognized.

The pupils in the convulsions are a subject of some dispute. It may be said that no rule can be laid down here; usually normal or slightly contracted, they may be widely dilated and occasionally they are unequal. Whatever may be their condition of dilatation, they are most frequently slightly susceptible to the influence of light, even in the height of the convulsion. In that condition in which convulsion follows convulsion in rapid succession they are most likely to be dilated.

Muscular twitchings are sometimes the harbinger of a convulsion, or they may come and go for an indefinite time, even without the existence of any other uræmic symptoms, though they are most frequently associated with a certain amount of headache or mental hebetude. Coma, as has been said, may follow a convulsion, or the convulsion may be succeeded by delirium, which in turn gives place to coma. Usually there is first a certain amount of mental hebetude, which is accompanied by headache, muscular twitchings, or other slight uræmic symptoms. This deepens—after lasting for hours, days, or even weeks—through

somnolence into coma. Sometimes the coma, after it has become well established, is interrupted by violent convulsions. Somewhat rarely coma appears suddenly as the first symptom, and in this case it may resemble strikingly cerebral apoplexy. As apoplexy has one of its common causes in the arterial degeneration of Bright's disease, there is much danger of confounding such a condition of sudden uræmic coma with it; but a careful examination, when the condition is uræmic, will show merely a general flaccidity of the muscular system and not any localized paralysis; or if there be paralysis, it will be much slighter than could be expected with the marked cerebral symptoms. The course of the case will clear up the diagnosis, if there be doubt in the beginning; in uræmia, if there be any slight paralysis, it will not deepen; while the coma, if it persists, will generally develop into a marked typhoid type. The condition of the pupils is not of any positive value, for in uræmia they may be distinctly unequal, though this is exceptional.

The diagnosis between the coma of alcoholism and uræmia is even more difficult. Alcoholism in the course of Bright's disease is one of the most frequent exciting causes of uræmia. The fact that there is an acute alcoholism present should always arouse a suspicion of the possible presence of uræmia. Aside from the history of the onset, which is the most important when it can be obtained, the best diagnostic points are that alcoholic coma is scarcely so profound nor is it so frequently associated with convulsions. Prognostically, coma is the most important of uræmic symptoms, for it is the one which most frequently announces oncoming death.

Headache is one of the very common symptoms of uræmia. Very early it is likely to be transient, occurring probably only in the morning. As the case progresses and other symptoms are added it becomes more intense and persistent, sometimes being so violent as to be agonizing. Not limited to any particular part of the head, our experience has been that it is most frequently frontal, while Dr. Osler¹ states that occipital headache is most common. Occasionally it resembles migraine, limited to one side of the head, usually frontal, excruciatingly severe, paroxysmal, and often attended by vomiting. Headache is not rarely the symptom which ushers in a grave attack of uræmia. Vertigo is frequently associated with the headache.

Neuralgias frequently occur early in the course of uræmia and often in the less marked cases. They may occur in the course of any nerve, but are most common in the distribution of the fifth cranial nerve, assuming generally the type of hemiçrania or facial neuralgia. They are not nearly so likely as headache to be associated with more pronounced

¹ Practice of Medicine, p. 739.

uræmia, and it is probable that the anæmia which is present plays as important a part as the uræmic poison in their etiology.

Occasionally formication, the sensation of pins and needles, or localized vasomotor effects, as, for instance, a condition of the fingers such as is found in Raynaud's disease, have been noted, and are probably uræmic, from the fact that they are associated with more definite symptoms. The formication is most frequently unilateral or limited to a single member. It is worthy of note that similar symptoms are found in dyspepsias, especially those of gouty character. A troublesome itching, sometimes general, sometimes confined to the genitals, is occasionally complained of. It is likely to be a late symptom and associated with the typhoid state, coming on at the close of a prolonged uræmia.

Localized palsies are of infrequent occurrence. They may undoubtedly be purely uræmic in origin, especially so when they are transient and follow a convulsion, or occur in the course of only slightly marked cerebral symptoms. When associated with coma or persisting it is questionable whether they are purely functional and not due to some slight pathological changes in the brain substance. Post-mortem examination of brains, when such paralyzes have persisted for some time before death, always shows some change, often a localized one, either cedema, congestion of the meninges, or punctiform cortical hemorrhages. The fact that such paralyzes occur usually in cases where there are widespread arterial changes, and when there have often been symptoms of brain involvement other than those unquestionably uræmic, would lend weight to the belief that though uræmia may be the actual exciting cause, yet the anatomical condition of the brain determines the exact symptoms. Acheson¹ has found, in addition to the gross lesions, microscopical changes in the cerebral matter. Delirium is a symptom of not very frequent occurrence, but so characteristic when it does occur that its significance cannot be too highly appreciated. Unless its importance be kept in view it may be misinterpreted, and a failure to make a correct diagnosis ensue. Usually it is of a mild talkative character, and it may persist for an indefinite time. A case typically illustrative has been under observation since January 27, 1893, and is briefly as follows:

CASE: Negro, man, aged fifty-one years; when first seen was passing twenty ounces of urine in twenty-four hours, heavily loaded with albumin and containing casts in abundance. Talkative—even noisy at times—wandering from subject to subject rapidly, and in no connected sequence, but always having most prominent religious subjects; it was impossible to obtain from him any reliable data as to the origin of his attack. Eventually he developed distinct delusions of a religious nature. During this period he had muscular twitchings, most marked in the upper

¹ Canadian Practitioner, vol. xiv, p. 125.

extremities. This state lasted two days, when it was interrupted by a marked convulsion, whereupon he was bled. A very trifling convulsion followed a few hours later on. After that the original delirium was re-established, and has since persisted.¹

Sometimes the delirium, especially in bad types of cases, is low and typhoid in form, and is attended with the general symptoms of the typhoid state. Here an early and unfortunate termination is to be feared. At any time, any form of delirium may be interrupted by maniacal outbursts, which are frequently precursors of convulsions, or the delirium may drift gradually into coma.

Closely associated with delirium is uræmic insanity, which may arise in the course of delirium, or without premonitory symptoms may supervene with startling suddenness. Though by no means common, its possible existence must be recognized. The forms ordinarily encountered are, in the order of their frequency, acute mania, delusional insanity, and melancholia. It is possible to have almost any type of insanity as the result of uræmia. Puerperal mania will not rarely be found to be uræmic.

CASE: A young woman pregnant with first child while in labor was, without premonitory symptoms, seized with a convulsion. This was relieved by free bleeding, but she went from the convulsion into a condition of most marked mania. This lasted for a week, when she began to grow rational, recognizing those about her. It was a month after the convulsion before her mind became fully restored. She had afterward no recollection whatever of her labor and subsequent mania, and only remembered very vaguely events which happened during her convalescence. The urine had not been examined before labor, but the first passed after the convulsion was loaded with albumin and contained numerous casts. By the time sanity was perfectly re-established albumin and casts had disappeared. Two subsequent pregnancies were attended with no demonstrable kidney lesion.

The delusional insanity is illustrated by the following:

CASE: A man aged forty-seven years, of alcoholic habits, had been dropsical since April, 1890. First came under observation in July, 1890, with general anasarca, diminished quantity of urine containing much albumin, some epithelial and a few oil casts. August 15, 1890, quantity of urine greatly diminished, and patient became delirious and noisy. Had the fixed delusion that his brother-in-law was about to kill him. The delirium cleared up entirely at times, but the delusion lasted throughout the disease—a period of three months. Died November 16, 1890. Autopsy showed typical chronic parenchymatous nephritis, with beginning contraction.

Of the special senses, sight and hearing are sometimes affected. Amaurosis, not a common symptom, is usually sudden in its onset and

¹ This condition lasted till death, late in April.

may be the first evidence of uræmia. It is not very grave prognostically, usually disappearing after a short time, oftentimes as suddenly as it came. Purely functional, no peculiarity of the eye-ground to account for it can be seen on ophthalmoscopic examination. An œdematous condition of the retina has been described, but it is more likely due to centric disturbance. In considering amaurosis as a symptom of uræmia it must be borne in mind that vision may be affected by albuminuric retinitis, and the ophthalmoscope must be used to clear up all doubt.

Deafness, resembling in its onset and course amaurosis, is said to be a uræmic symptom; but of this we cannot speak authoritatively, having never seen a case.

GASTRO-INTESTINAL.—A buccal and pharyngeal form of uræmia has been described and attributed to an effort at elimination of the poison by the salivary glands and mucous membrane of the mouth and pharynx. It seems to us that these so-called symptoms are merely part of the exhausted or even typhoid state into which victims of Bright's disease may fall. Salivation may be, however, an actual symptom of uræmia, as we shall show in the course of our experiments. It is probably centric in its origin. While we have noted a pretty free flow of saliva in a few cases, but never except in pronounced uræmias, we consider this symptom of little importance clinically. It may be worthy of note that in our experience mercurial salivation is more frequent in Bright's disease than when the kidneys are healthy.

Vomiting is rather a common symptom. It is likely to come on early and may often be the precursor of a convulsion or other grave uræmic symptom. The matters vomited are first ingesta, then mucus, often bile-stained; nausea is rare and ingestion of food has little influence. The vomiting comes on suddenly and may persist an indefinite time, often ceasing and recurring irregularly. In the more chronic cases vomiting is often persistent and intractable. Here the matters vomited may be strongly alkaline in reaction, due to the presence of carbonate of ammonia. The carbonate of ammonia is produced by decomposition of urea excreted by the mucous membrane of the stomach from the blood. In these cases the vomiting is not centric, but due to a direct irritation of the stomach by the carbonate of ammonia. In other cases the vomiting is probably centric, as our experiments will show. There is in some cases a swollen or dropsical condition of the mucous membrane, as pointed out by Bartels. In considering vomiting as a symptom of uræmia, it must be remembered that in Bright's disease there is very generally a marked disturbance of the stomach as a part of the universal depression of tone of the system.

Diarrhœa, not so common as vomiting, is usually due to irritation by carbonate of ammonia, and is less likely than vomiting to occur early. Sometimes the irritation is so excessive and prolonged as to lead to an

actual inflammation or ulceration of the intestinal mucous membrane, attended by the presence of blood in the stools. Vomiting and diarrhœa seem to be eliminative, for when they are present nervous symptoms are uncommon, and nervous symptoms may even cease upon the establishment of a sharp diarrhœa.

CARDIO-RESPIRATORY.—The heart's action is seldom definitely disturbed. Occasionally, preceding a convulsion, the pulse is slowed; more often it is accelerated, but so inconstant is any such disturbance that it is of no diagnostic value. Rarely uræmia seems to be productive of tachycardia.

CASE: A woman, forty-four years old, the subject of chronic interstitial nephritis. No demonstrable arterial changes. Pulse persistently rapid, never falling below 100 and often irregular. Had for some time trifling uræmic symptoms, and finally went into a condition of pronounced uræmia, with active delirium, alternating with stuporous intervals. At this time the pulse increased in frequency, ranging between 160 and 180. After the uræmia subsided the pulse slowed somewhat, varying, as before the uræmic attack, between 100 and 140.

Occasionally uræmic attacks will be accompanied by violent palpitation.

Dyspnœa is an important symptom and one that is present not rarely. It shows itself in two forms: constant shortness of breath and paroxysms of asthma. In the first form the shortness of breath shows itself in the beginning only on exertion, afterward becoming constant and so marked that the patient is unable to lie down. It differs very little in its symptoms from other dyspnœas, though, as a rule, when the condition becomes well marked the respirations are rather full than shallow. Many cases of dyspnœa in the course of nephritis are really not uræmic, but can easily be explained by the physical condition of the lungs or heart.

Asthma is rarer than simple dyspnœa. The attacks resemble exactly bronchial asthma, and are most frequently nocturnal. Physical examinations will show a much-prolonged expiration and possibly bronchial râles. Occasionally these asthmatic attacks are interchangeable with other uræmic symptoms.

CASE: Man, aged sixty-six years; had been under observation for about a year. Urine contained albumin and casts. Some arterial sclerosis. On two occasions, after a short period of mental hebetude, there was developed a slight loss of power on the right side. Sensation was not interfered with, nor was there any affection of speech. On both occasions power was fully restored after the lapse of a few days. Finally, after similar mental symptoms, a paroxysm of asthma came on. In the next three days he had a number of asthmatic attacks, and died in one of them. Physical examination during the paroxysms showed slight pulmonary congestion, with prolonged harsh expiration. During the interval no abnormality in the lungs could be detected. The physical signs were not bilateral, sometimes one lung, sometimes the other, being their seat.

Cheyne-Stokes respiration is only noted in exceptionally severe cases, and usually those of a comatose type. It is a very grave symptom, and the cases in which it occurs usually terminate fatally, though exceptionally recovery may occur.

CASE: Man, aged fifty-five years; epileptic. Urine contained albumin and hyaline and granular casts. In July, 1890, had first attack of uræmia, from which he recovered. In November, 1890, became comatose again, and remained so several days. During the attack, Cheyne-Stokes respiration was present for nearly two days. Recovered from this attack, and in March, 1891, developed uræmia again and died. Cheyne-Stokes respiration was also present in the last attack. Autopsy showed a very small left kidney (probably non-development). Right kidney showed chronic parenchymatous degeneration with considerable contraction, and a few scars, apparently the result of infarcts.

During any uræmia the breath has frequently a urinous odor, and so characteristic is this that it is of great importance diagnostically.

TEMPERATURE.—The temperature of uræmia is not a fixed symptom. It may be normal, or above or below. In a convulsion the temperature is likely to be high, just as with any other convulsion; but without any convulsion there are some cases in which the temperature is persistently high even when there is absolutely no inflammatory lesion to account for the pyrexia. Is this high temperature an integral part of uræmia? It occurs in the presence of other symptoms unquestionably uræmic, may abate coincidentally with the subsidence of uræmia, and is the result of no demonstrable lesion, so that we are forced to the conclusion that it is really part of uræmia. There is really nothing theoretically to forbid such an assumption. Uræmia being due to a poison acting upon the central nervous system, the poison may easily disturb the heat-centres. Of the exact mechanism of the production of the fever it is impossible in the present state of our knowledge to speak at all confidently. This persistent high temperature, while rare, is sufficiently common to be of importance, and the literature of the subject for the past few years contains numerous examples. The following table shows the condition of the temperature in forty cases of uræmia. The cases were selected from a large series observed as containing no element other than uræmia that might disturb the temperature, and in every one of them the diagnosis was verified by a post-mortem examination. When the only temperature given is that in the column of averages, the variations were so slight as to be insignificant, and merely the average is noted.

INTERSTITIAL NEPHRITIS.

Number of case.	Sex.	Extremes of temp.	Average temp.
1	Male.	98.0° to 101.2° F.	98.8° F.
2	"	96.4 " 98.0	97.4
3	"	98.0 " 99.4	98.7
4	"	— —	98.8
5	"	— —	96.6
6	"	— —	98.3
7	"	96.4 to 98.0	97.5
8	"	98.4 " 99.6	99.0
9	"	— —	97.9
10	"	— —	99.0
11	"	— —	98.4
12	"	— —	97.1
13	"	97.0 to 99.5	98.4
14	"	95.0 " 98.0	96.8
15	"	96.0 " 100.0	98.0
16	"	97.0 " 100.0	98.3
17	"	97.0 " 99.8	98.3
18	"	97.6 " 98.6	98.0
19	"	98.0 " 99.8	98.9
20	Female.	98.0 " 100.2	99.1
21	"	96.4 " 98.0	97.1
22	"	94.0 " 101.6	99.5

PARENCHYMATOUS NEPHRITIS.

Number of case.	Sex.	Extremes of temp.	Average temp.
23	Male.	98.0° to 101.0° F.	99.4° F.
24	"	100.6 " 104.3	101.8
25	"	— —	97.4
26	"	— —	97.2
27	"	— —	96.8
28	"	99.3 to 102.0	101.9
29	"	— —	99.0
30	"	96.8 to 98.8	97.6
31	"	98.2 " 99.0	98.6
32	"	— —	97.2
33	"	— —	97.1
34	Female.	— —	97.9
35	"	100.0 to 103.8	102.0
36	"	98.0 " 101.0	99.0
37	"	97.0 " 100.8	99.2
38	"	— —	98.8
39	"	— —	98.2
40 { (Pyelo- nephritis) }	"	97.6 to 100.0	98.4

From this it will be seen that no rule can be laid down for the temperature. In considering the effect of the variety of kidney lesion only one fact can be obtained which is important—high temperature is more common in parenchymatous nephritis. The temperature was rather more frequently below than above normal, but the difference is scarcely so striking as to be of much value. It is to be noted, too, that in some cases the range was quite extensive, varying between distinctly

subnormal and pyrexia. The variety of uræmia present does not seem to have any constant effect. When the range was great the highest temperature was rather to be found toward the end than in the early stages. The following experiments upon dogs were undertaken with the object of determining the effect upon temperature produced by the introduction into the blood of substances supposed to be active in the production of uræmia. The temperatures are given in Centigrade.

EXPERIMENT I.—Dog, weight 18 pounds.

Time.	Blood pressure.	Pulse. (10 sec.)	Respiration. (30 sec.)	Temperature.
11.55 A.M.	122 mm.	27	22	39.4° C.
12.05 P.M.	Injected per jugular vein 10 c.c. human urine.			
12.05½	68	28	19	—
12.08	10 c.c. human urine.			
12.09	72	30	16	—
12.15	122	23	17	—
12.16	10 c.c. urine per jugular.			
12.26	116	23	14	37.5
12.26½	10 c.c. urine.			
12.27	82	25	Irregular.	—
12.28	116	20		16
12.34	10 c.c. urine.			
12.35	96	22	16	—
12.41	114	22	16	—
12.42	10 c.c. urine.			
12.49	114	22	14	37.4
12.50	10 c.c. urine.			
12.57	110	27	—	—
12.57½	10 c.c. urine.			
12.58	94	28	15	—
1.04	112	24	—	—
1.04½	10 c.c. urine.			
1.06	92	26	16	—
1.10	104	24	—	—
1.10½	10 c.c. urine.			
1.11	86	27	—	—
1.15	10 c.c. urine.			
1.16	90	27	18	—
1.23	100	25	—	37.0
1.23½	10 c.c. urine.			
1.25	90	27	21	—

Animal killed.

EXP. II.—Dog, weight 35 pounds. Practically a repetition of Experiment I., in which 285 c.c. of human urine was injected intravenously. The injections were made about every five minutes in quantities of 10 c.c., 15 c.c., and 20 c.c. No effect was produced other than a fall of temperature of 1.4° C. in 1½ hours. The pressure was lowered somewhat immediately after the injection, soon returning to the normal, and was not affected as much toward the end of the experiment as it was in the beginning.

EXP. III.—Dog, weight 12 pounds.

Time.	Pressure.	Pulse.	Respiration.	Temperature.
11.25 A.M.	154 mm.	32	42	39.3° C.
11.28	Injected per jugular vein 20 c.c. of 20 per ct. sol. of <i>uræa</i> .			—
11.29	158	24	24	—
11.40	170	15	—	—
11.40½	Injected 20 c.c. of 20 per cent. solution of urea.			—
11.41	166	15	—	—
12.06 P.M.	184	21	20	38.0
12.07	Injected 20 c.c.			—
12.08	186	20	—	—
12.26	150	19	15	—
12.27	Injected 20 c.c.			—
12.28	164	18	15	37.3
	Urinated very freely.			—
1.15	140	20	—	37.3
2.25	Ligated right renal artery.			—
2.26	156	18	—	37.5
Animal killed.				

EXP. IV.—Dog, weight 20 pounds. Practically a repetition of Experiment III., in which 140 c.c. of 20 per cent. solution of urea was injected into the vein in the course of two hours. No effect was produced other than a fall of temperature of 1° and a profuse diuresis. At the end of two hours both renal arteries were tied and the observation continued for 1½ hours, but no change in the condition of the animal resulted.

EXP. V.—Dog, weight 46 pounds.

	Time.	Pressure.	Pulse. (10 sec.)	Respiration. (30 sec.)	Temperature.
Nov. 21st.	1.40 P.M.	100 mm.	21	30	40.5
	2.15	Right renal artery tied, antiseptically.			—
	3.00	110	22	42	40.2
	Walks all right when untied.				
Nov. 22d.	12.12 P.M.	106	23	—	40.5
	12.25	Left artery tied.			—
	1.08	86	21	33	40.4
	Animal quite dull.				
	2.00 P.M.	60	22	26	40.4
	2 45	60	23	—	40.4
	Seems very sick.				
Nov. 23d.	11.00 A.M.	Dog very sick.		—	39.0
	5.30 P.M.	—	—	—	40.0
	Animal died during night.				

EXP. VI.—Dog, weight 14 pounds.

	Time.	Pressure.	Pulse.	Respiration.	Temperature.
Nov. 26th.	2.00 P. M.	116 mm.	32	—	39.7°
	2.10	Injected per jugular 10 c.c. dog's urine.			—
	2.11	52	36	—	—
	2.16	92	26	—	—
	2.16½	10 c.c. dog's urine.			—
	2.17	44	27	—	—
	2.25	84	25	—	—
	2.25½	10 c.c.			—
	2.26	46	28	—	39.5
	2.33	80	23	—	—
	2.33½	10 c.c.			—
	2.34	54	32	—	—
	2.40	74	27	—	—
	2.40½	10 c.c.			—
	2.41	48	31	—	39.5

Injectations were continued in this way (10 c.c. at a time) until 100 c.c. had been given in all at 3 P.M. Pressure fell after each injection as above. No other effect.

	Time.	Pressure.	Pulse.	Respiration.	Temperature.
Nov. 26th.	5.30 P.M.	90 mm.	—	—	39.8° C.
Nov. 27th.	11 A.M.	Dog very sick.	—	—	40.0
	2 P.M.	46	19	—	—
	2.19	Injected 10 c.c. dog's urine per jugular.	—	—	—
	2.19½	18	11	—	—
	2.20	Dog died.			

EXP. VII.—Dog, weight 18 pounds. Injected intra-venously 120 c.c. dog's urine, in doses of 10 c.c., at intervals of five minutes. The pressure was lowered greatly immediately after each injection, and two hours after the last injection was only half the normal. The pulse and respiration were slowed considerably and the temperature fell 2° C. Nov. 29th, temperature was 1.5° above normal all day. Dog died during night.

EXP. VIII.—Dog, weight 15 pounds. Injected into jugular vein 20 c.c. dog's urine in doses of 5 c.c. every ten minutes. The temperature was reduced about 1° C., but had returned almost to the norm four hours after the last injection. Next day injected 8 c.c. in doses of 2 c.c. every half-hour with practically no effect on the temperature.

EXP. IX.—Dog, weight 19 pounds. Injected subcutaneously 8 c.c. dog's own urine without any effect on the temperature.

EXP. X.—Dog, weight 18 pounds. Injected 5 c.c. dog's urine subcutaneously. No effect.

EXP. XI. and XII.—Dog, weight 15 pounds. Injected dog's own urine subcutaneously without producing any effect.

EXP. XIII.—Dog, weight 17 pounds. Injected subcutaneously 5 c.c. urine from a case of Bright's disease passing f₃xx per diem. Observed four hours after injection. Temperature fell 0.6° C. in three hours.

EXP. XIV.—Dog, weight 14 pounds. Injected subcutaneously 2 c.c. same urine as in Experiment XIII. Had no effect.

EXP. XV.—Dog, weight 17 pounds. Injected subcutaneously 4 c.c. urine from same case Bright's disease as in Experiment XIII. Temperature fell about 1° C. in two hours.

EXP. XVI. and XVII.—Injected subcutaneously 0.16 gm. and 0.8 gm. kreatin. No effect at all upon the temperature.

EXP. XVIII.—Injected slowly 0.12 gm. kreatin into jugular vein. No effect upon pressure, pulse, or respiration. Temperature fell about 1.5°, but animal was tied down all the time.

EXP. XIX.—Injected 0.2 gm. kreatin without any effect.

EXP. XX.—Dog, weight 15 pounds. Injected slowly into jugular vein 2.48 gm. of kreatin with absolutely no effect on pressure, pulse, or respiration. The temperature fell some, but dog was tied down for about an hour and a half.

EXP. XXI and XXII.—Injected 0.1 gm. kreatinin subcutaneously in each experiment without any effect.

EXP. XXIII.—Dog, weight 24½ pounds. Injected into jugular 0.22 gm. kreatinin without any effect on pressure, pulse, respiration, or temperature.

EXP. XXIV.—Dog, weight 15 pounds.

3.45 P.M. Normal temperature 38.9° C.

4.30 Injected per jugular vein 50 c.c. blood serum¹ from a case of uræmia with hyperpyrexia.

¹ Blood taken with all precautions as to antisepsis, so that bacterial contamination did not take place.

- 4.45 Temperature 39° C.
- 4.55 Injected 50 c.c. blood serum.
- 5.15 Injected 50 c.c. blood serum.
- 5.20 Temperature 39.7° C.
- 5.30 Injected 50 c.c.
- 5.45 Temperature 39.4° C.
- 6.00 Temperature 39.4° C.

EXP. XXV.—Dog, weight 15 pounds.

- 3.40 P.M. Normal temperature 38.9° C.
- 4.15 Injected per jugular vein 50 c.c. blood serum from same case as in Experiment XXIV., heated to 58° C.
- 4.40 Injected 50 c.c.
- 4.50 Temperature 38.8° C.
- 5.10 Injected 30 c.c.
- 5.18 Temperature 38.4° C.
- 5.40 Temperature 38.2° C.

EXP. XXVI.—Large white rabbit.

- 4.00 P.M. Normal temperature 39.6° C. Injected subcutaneously 25 c.c. of blood serum from a case of uræmia without pyrexia.
- 4.40 No effect apparent.
- 5.00 Injected 50 c.c. subcutaneously. Rabbit lying on side and breathing very rapidly.
- 5.30 Temperature 37.5° C.

EXP. XXVII.—Black rabbit.

- 4.00 P.M. Normal temperature 39.8° C. Injected subcutaneously 25 c.c. same blood serum used in Experiment XXVI., heated to 55° C.
- 4.40 Apparently no effect.
- 5.00 Injected 50 c.c. subcutaneously.
- 5.30 Temperature 39.8° C. Apparently not affected in any way.

EXP. XXVIII.—Dog, weight 17 pounds.

- 1.20 P.M. Playful, normal temperature 38.7° C.
- 1.30 Injected subcutaneously 75 c.c. blood serum from a case of uræmia.
- 1.45 Purged; seems sick; not playful.
- 2.00 Drowsy.
- 4.00 Still seems sick; temperature 38.8° C.

EXP. XXIX.—Dog, weight 20 pounds.

- 2.00 P.M. Normal temperature 38.6° C.
- 2.20 Injected 100 c.c. same serum as in Experiment XXVII., heated to 55° C. for ten minutes.
- 3.00 Playful, and does not seem sick.
- 4.00 Temperature 39.2° C. As playful as before the injection. Does not seem to be at all affected.

The dogs were placed as nearly as possible under identical conditions of environment and the injections done in the same manner, so that any disturbing element other than the injected substances would act in a similar manner in every experiment.

Human urine, both healthy and that from Bright's disease, urea, kreatin, and kreatinin produced uniformly a fall of temperature. As this was the most marked in those cases where large doses were used, it is probable that some of the fall, or all of it, may be due to the water injected, and not to any specific action of the solids.

In analyzing the effects of the injection of dog's urine it will be seen that when small quantities were used the same fall of temperature

resulted as in the other experiments, but when large quantities were injected the temperature rose. It is true that at first there was a fall, and then a rise occurred secondarily, at a period when observation had ceased in the other experiments, so that this fact may be for comparison robbed of a certain amount of value. It may be noted that in Experiment V., in which the renal arteries were tied, there was no such rise, so that it was not the result of the operation *per se*.

The experiments in which blood serum was used are not altogether definite in their results. However, it seems probable that uræmic blood contains a poison which is capable of producing a rise of temperature.

(To be continued.)

ROUND-CELLED SARCOMA OF THE ANTERIOR MEDIASTINUM:

EXTENSIVE METASTASIS, INCLUDING THE BRAIN, BOTH CHOROID
COATS, OCULO-MOTOR AND OPTIC NERVES, AND EXTERNAL
OCULAR MUSCLES.

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AN Italian laborer, aged twenty-one years, was admitted to the Pennsylvania Hospital October 1, 1888. The history is as follows: He was well and strong until June, when he had ague of the tertian type. For forty days before admission he was unable to work, owing to pain in the head and shortness of breath, which for ten days amounted to orthopnea, and his breathing was wheezing. The urine was scanty and passed infrequently. On swallowing he had a burning sensation behind the sternum, and the act provoked coughing, but he did not vomit. He had no appetite and was wakeful at night. There was diplopia for at least ten days before coming to the hospital.

On admission the patient is a fine, strongly developed man. The face is dusky-red and congested, the neck broad and very thick-looking, and its veins and those in the upper part of the chest full and turgid. The eyeballs are markedly staring, and there is slight external strabismus of the right eye. The tongue, when protruded, is not deflected to either side.

The arms and hands are cyanotic, but there is no cyanosis of the feet or legs. The dyspnea is very urgent, and he is entirely unable to lie down. There is, perhaps, some slight difference in the volume of the two radial pulses at the wrists. The heart sounds are clear and no murmur is audible. There is dulness on percussion at the lower portions of the lungs posteriorly, and whistling, dry râles are to be heard over

the lungs everywhere. There is a roaring sound as if from obstruction of the trachea or bronchi, and this is more marked upon the right than upon the left side. He expectorates a good deal of watery, blood-stained fluid.

Death occurred in great agony from suffocation about twenty-four hours after his admission to the hospital.

The *post mortem* examination revealed the presence of a large fleshy mass lying behind the sternum. This was wedge-shaped, with the base above, and was perhaps three inches wide by five vertically. It lay behind the sternum and over the pericardium, and completely surrounded the bloodvessels and the trachea, except a little of its posterior wall. The trachea was much compressed and pushed or dragged to one side, being thus out of the median line.

The innominate artery divided within the mass, and its two branches were narrowed. The carotid, a short distance from its origin, showed destructive erosion so great that the wall was very thin. The left innominate vein was included within the tumor, and it and the carotid and subclavian veins which formed it were all markedly narrowed.

The heart appeared to be of about the normal size, and its valves and cavities and the openings looked natural. Upon the surface of the heart the vessels appeared tortuous and thick, and stood out in an unusual way. On cutting across such vessels they appeared to be surrounded with neoplastic material. At the apex there were several spots which were dark-red and looked like ecchymoses. At the base of the heart there was neoplastic material deposited upon the great vessels and on the auricles, and at one place this extended across to the parietal layer of the pericardium, which was ragged-looking.

The pleural sacs both contained bloody serum, the right being tightly distended, and the right lung compressed and carnified. Both lungs showed here and there upon their surfaces spots of neoplastic deposit, and upon the pleural surface of the diaphragm, upon the right side, there were a number of quite large nodules.

The liver was large, weighed four pounds fourteen ounces, and was very full of blood. On section it presented the nutmeg appearance.

The spleen was about five times the natural size and very firm in texture.

The mesenteric glands were greatly enlarged and were sarcomatous. The kidneys presented numerous nodules upon their surfaces, and on section areas of sarcoma were seen scattered through the parenchyma.

The brain itself presented no gross evidence of disease. The oculomotor nerves were both enlarged, the right one being fully twice as large as the left, and presenting a pear shaped swelling just within the cranial cavity, before its entrance into the sphenoidal fissure.

Sections were prepared for microscopical examination of the primary growth which lay in the mediastinum. Of this, sections from three positions were cut, one taken from the body of the mass, and two including the right carotid artery—one of the eroded portion of the vessel, and the other of a portion in which the walls were still whole. Of the heart, sections were cut from two positions, one near the apex, and the other of the septum on the anterior surface, including an artery in the pericardium. Two sections of the lung were prepared from different positions. Sections were cut of mesenteric glands, of the diaphragm, including a sessile growth upon its pleural surface, of the liver, the spleen, and two from different parts of the kidney.

Of the nervous system, sections were prepared of the cerebellum, of both oculo-motor and of both optic nerves, just within the cranial cavity and before their entrance into the sphenoidal fissures and optic foramina—of the posterior portions of both eyes showing the nerve entrances, and of the optic nerves and surrounding muscles and nerves behind the eyeballs.

The total number, therefore, of different portions of tissue subjected to microscopical examination was twenty-two, and all of them exhibited, to a greater or less extent, sarcomatous infiltration. The infiltrating material was of the commonly described round-cell variety, and in sections stained with carmine the cells seized the pigment with avidity, producing a very intensely red color. This seems to be a marked peculiarity of the cells of sarcoma, the color generally being more intense even than that of carcinomatous growths.

The primary growth in the mediastinum, which very probably originated in some remnant of the thymus gland, presented the usual appearances of round-celled sarcoma. The only specially noticeable feature of the growth was the erosion of the carotid artery. The only portion of the walls of the vessel remaining upon the side where the erosion had occurred was the external fibrous coat; the muscular layer and intima had disappeared entirely.

The sections of the heart showed the neoplastic material to lie more abundantly in the adipose tissue upon the surface than anywhere else. It followed the lines of the connective tissue, the rings constituting the boundaries of the fat cells being infiltrated. In places where the amount of deposit was still moderate the centres of the fat cells retained their usual appearance of being empty, but where it was great the cells had pressed inward until the spaces were filled up, and the appearance was one of a solid mass of the neoplastic round cells. At the point of junction of the overlying fat with the muscular substance of the heart, the great abundance of the neoplastic material ceased abruptly, as though it had found the invasion of the muscular territory more difficult. The sarcoma cells, however, were plainly to be seen amongst the muscular fibres, especially along the connective-tissue lines, but they were few and sparse as compared with the vast numbers of them in the fat layer. The invasion by the sarcomatous cells had penetrated very deeply into the muscular tissue, following the lines of the connective tissue and lying between the fibres.

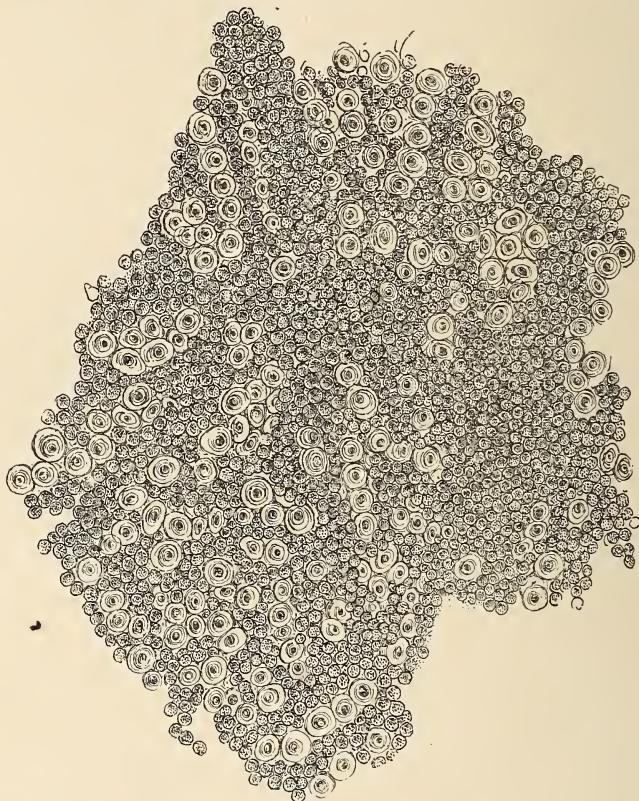
In the lung the sarcomatous infiltration had followed the connective-tissue lines, the pulmonary trabeculæ being enormously thickened and presenting themselves as masses of round cells. The walls of the air cells were also infiltrated in places, and where the growth had fully taken possession of an area, the cells had multiplied so that the air spaces were filled up, causing the lung to be quite solid. The nodules upon the pleural surface of the diaphragm were composed of masses of round cells, presenting no unusual features.

In the liver were many areas of varying size infiltrated with round cells, which had stained intensely red. None of these were large, nor had the macroscopical examination revealed the presence of any nodules sufficiently large to be seen with the naked eye. It seems fair, however, in view of the fact that sarcomatous infiltration had occurred so extensively into so many tissues and organs, to assert that these small

infiltrations into the liver were but an early stage of the same malignant disease which had progressed so much further in other places.

The spleen and mesenteric glands were sarcomatous, as was easily seen from their gross appearance, but as their natural histological appearances so closely resemble those of a round-celled sarcoma, the only especially noticeable characteristic of them was the intense red staining of their cells.

FIG. 1.



Section of the right oculo-motor nerve, showing extensive sarcoma infiltration.

The kidneys presented numerous nodules, both upon the surface and more deeply seated within their substance. These, when examined microscopically, were seen to be sarcomatous, the neoplastic cells lying between the bloodvessels and renal tubules in the connective tissue, except where the deposit had become very extensive, in which case the renal tissue was overwhelmed, and the appearance was simply that of a mass of the characteristic round cells. In one place there was found a layer, somewhat less than a thirty-second of an inch in depth, of sarcomatous deposit upon the surface of the kidney. The neoplasm included the capsule, and the separation of the diseased from the healthy renal

tissue beneath it was very sharply marked. Hemorrhage into this neoplastic material directly beneath the capsule had occurred.

The appearances of the sections of the cerebellum were not easy to interpret. The portions of pia mater included were infiltrated, especially around the bloodvessels, with cells precisely similar in appearance to those which in other places were beyond doubt sarcomatous. In view of this fact it seems fair to assert that the disease had invaded the pia mater, and this is the more just and reasonable, as a precisely parallel condition existed in connection with the eyes, as may be seen from the following description.

Left oculo-motor nerve. The individual nerve fibres are of normal appearance, axis-cylinder and medullary substance presenting their natural characteristics. Here the normal constitution ceases, and the nerve bundles and in many places the individual fibres are separated by collections of round sarcoma cells, which have closely followed the connective-tissue septa and the bloodvessels supported by them. In other words, instead of the ordinary membranous investment of the fasciculi, this has been changed into one composed of the cellular elements of the sarcoma.

In the *right oculo-motor nerve* precisely the same process is repeated, only the infiltration of the perineurium and endoneurium is so extensive that the appearance is that of a section of ordinary round-celled sarcoma, through which are interspersed here and there single, normally constituted nerve fibres. (Fig. 1.)

Portion of the posterior half of the right eyeball and 9 mm. of the optic nerve in longitudinal section. Beginning from the extra-ocular end of the optic nerve and passing to the lamina cribrosa, there is no marked change in the nerve bundles and no increase in the nuclei. The trabeculae of connective tissue are more developed than in the normal nerve, but they are not infiltrated with sarcoma cells. Toward the extra-ocular end of the nerve are several capillary vessels, around which are clustered numerous round cells. The lumen of the central arteries contains a few blood cells, and in addition small collections of larger, deeply stained lymphoid cells—a condition which repeats itself more decidedly in several adjoining vessels or branches. The outer sheath is thickened, but not infiltrated; the inner sheath is unchanged. The intervaginal space contains numerous darkly stained round cells gathered in the meshes of loose fibres. The nerve entrance is free from changes, evidences of neuritis being entirely absent.

The *retina* is badly broken and misplaced, rendering an accurate study of its elements difficult, which, save for some proliferation of the internal nuclear layer and distinct thickening of the fibre layer, are free from pathological changes. The pigmented epithelium appears only in fragments clinging to the choroid coat.

The *choroid* to the left of the nerve entrance, so far as the lamina vitrea and chorio-capillaris are concerned, presents no abnormalities. The bloodvessels of the stroma are well filled with corpuscles and some darkly stained cells. Here and there the leucocytes of this region are gathered together in small collections. The pigment cells, very dark, appear in characteristic variety of shapes.

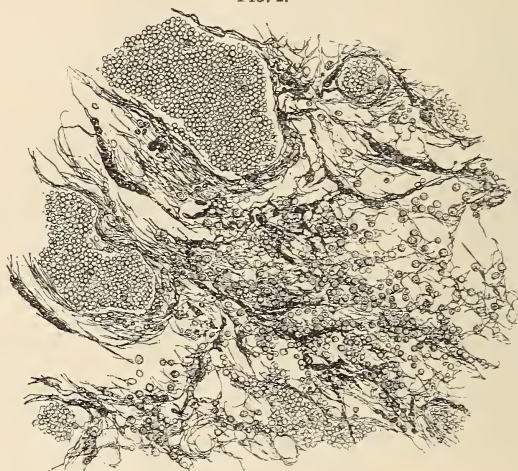
To the right of the optic nerve the choroid is detached from the sclera, thicker than on the opposite side, and, in addition to the appearances just described, presents in several spots in close relationship with vessels

in the stroma considerable collections of round, darkly stained cells, which, in general character and grouping, undoubtedly belong to the sarcoma infiltration.

The *sclera* is free from abnormal appearances, but in the branches of the ciliary nerves passing through it there are small round cells suggestive of those which have infiltrated the oculo-motor to such a great extent.

Posterior half of the left eyeball and 8 mm. of the optic nerve in longitudinal section. So far as the optic nerve, optic-nerve entrance, retina, one-half (left) of choroid and sclera are concerned, the description just given applies so nearly that it need not be repeated. The right half of the choroid remains *in situ* for 3 mm. from the optic-nerve entrance. Then it becomes detached from the sclera and is greatly thickened.

FIG. 2.



Section of the left choroid, showing large bloodvessels, pigmented cells, and secondary sarcoma deposit.

The branching, pigmented cells are massed together on the outer part, and also surround the well-filled vessels of the stroma, between which are gathered areas of round sarcoma cells, interspersed with pigment granules and dark, spindle-shaped cells. The chorio-capillaris can be traced unbroken throughout the section, but is indistinct directly over the thickest part of the affected choroidal tissue. The sarcoma cells are dispersed through the layer of choroidal stroma containing large blood-vessels, but are especially massed in several localized areas. Some of the larger veins contain darkly stained cells analogous in their appearance to those which lie outside of the vessel walls. (Fig. 2.) This area of infiltration begins 3 mm. from the nerve entrance, and is 1 mm. in diameter at its thickest portion.

*Transverse section of the contents of the left orbit about 14 mm. anterior to the foramen opticum.*¹ The relation of the parts (muscles, vessels, nerves, etc.) one to the other is undisturbed.

¹ This section corresponds almost exactly with Table VI. of Lange's *Topographische Anatomie des menschlichen Orbital-Inhalts*, and has been studied with the aid of this diagram.

Muscles. The external, internal, superior rectus, and levator palpebræ superioris are normal in appearance; the inferior oblique is not included in the section. The inferior rectus contains a patch, constituting about one-third of the section, situated in the upper part, which presents an

FIG. 3.



Transverse section of contents of the left orbit 14 mm. anterior to foramen opticum: A. Inferior rectus, showing patch of sarcoma in muscle. B, C, D, E. External, internal, and superior rectus, and levator, unaffected. F. Superior oblique; sarcoma between the optic nerve and the inferior rectus.

exquisite picture of infiltration with round sarcoma cells. The connective-tissue investments of the individual fibres and of the fasciculi are literally replaced with the cells of the new growth; while the sheath of areolar tissue covering the entire muscle in the affected area is crowded with the elements of the neoplasm, which extend into the surrounding fibro-fatty tissue of the orbit. For the most part the diseased area is sharply separated from the portions of the muscle which remain unaffected, although in places small trains of cells proceed a short distance into neighboring areas along the internal perimysium.

The section of the superior oblique is more freely supplied with darkly stained nuclei and corpuscles than those of the other muscles, and in one

or two spots, in the neighborhood of small bloodvessels, are collections of larger lymphoid cells, probably representing small foci of sarcomatous infiltration. (Figs. 3 and 4.)

Optic nerve. The nerve itself is normal, but in the intervaginal space, clinging closely to the inner sheath, are many small round cells, while in the fibro-fatty tissue, between the nerve sheaths and the inferior rectus

FIG. 4.



Section of inferior rectus, showing infiltration of sarcoma cells between fibres.

muscles are numerous collections of sarcoma cells, particularly immediately in relation with the cross-sections of the ciliary arteries.

Other nerves. The ciliary nerves, naso ciliary nerve, branches of the oculo-motor, supra-orbital, and a branch of the trochlear have been identified. In none of them are the appearances repeated which have been described with the main stem of the oculo-motor. Of the nerves just named the supra-orbital is more richly supplied with corpuscles and nuclei than the others, but there are no sarcoma cells between the nerve fibrils. The branches of the nerves supplying the inferior rectus, contained within the body of the muscle, although themselves not infiltrated, are literally surrounded with sarcoma cells, which infiltrate their external connective-tissue investments.

Bloodvessels. The following bloodvessels are evident in the section: the supra orbital, ophthalmic, and ciliary arteries and branches of the ophthalmic veins. The coats of these vessels are free from infiltration, except in the case of the ciliary branches lying between the optic nerve and the patch of infiltration in the inferior rectus, and even in these the sarcoma cells lie rather in the loose fibro fatty tissue adjacent to the vessels than in the coats of the artery itself, although in some instances small foci may be seen in the adventitious tunic. In the small vessels

supplying the inferior rectus muscle this character of infiltration (*i. e.*, within the adventitious coat) is more conspicuous.

Transverse section of a portion of the contents of the right orbit. As the contents were fragmentary, the relation of the various constituents to each other, and consequently their identification, is imperfect.

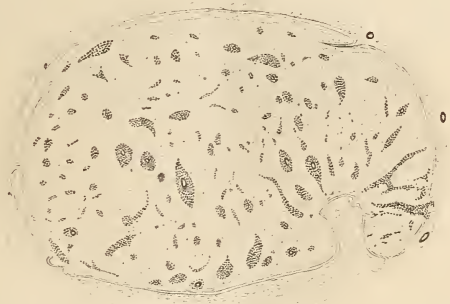
Muscles. The following muscles appear to be included: superior rectus, levator palpebræ superioris, a fragment of the superior oblique, and the internal (or inferior) rectus. These structures have escaped the sarcomatous infiltration, with the exception of the last-named muscle, which contains two patches of diseased tissue exactly similar to the one described in the inferior rectus of the left orbit. The branches of the oculo-motor nerve supplying this muscle are not only surrounded by sarcoma cells, but the individual fibres have been separated by the elements of the new growth precisely as the same process has occurred in the main stems of both third nerves.

The optic nerve is normal in appearance, but in the intervaginal space the collections of round cells are more evident than in the corresponding situation on the opposite side.

The bloodvessels, except the small branches which supply the muscle in the area of infiltration, are free from sarcomatous deposits.

Cross-sections of the optic nerves just within the skull. The dural sheaths are not visible in the section; the inner (pial) sheath is densely infiltrated with sarcoma cells, which, passing inward from this situation along the

FIG. 5.



Transverse section of optic nerve just within skull, showing general plan of the sarcoma infiltration.

trabeculæ, infiltrate those in and within the margins of the nerves. In general, the nervous tissue appears normal, and there is no undue development of nuclei. Each capillary and arteriole, however, is surrounded with a considerable area of neoplastic cells, which completely replace the adventitious coat and perivascular sheaths of the larger vessels, and entirely fill the spaces surrounding the smaller ones. Within the lumen of many of the vessels are cells exactly the counterpart of those which surround them. (Figs. 5 and 6.)

The case seems worthy of being described and recorded, as sarcoma of the mediastinum is by no means common, and as the metastatic growths were more fully examined and studied with the microscope than can be or

FIG. 6.



Portion of Fig. 5 more highly magnified, showing arrangement of sarcoma cells surrounding the bloodvessels.

has been done in most of the cases recorded in the journals, but especially on account of the condition of the eyes and their appendages. As has already been said in connection with the description of the macroscopic conditions, as noticed at the post-mortem examination, nothing abnormal was seen except the difference in size of the two oculo-motor nerves. It would probably have escaped notice that the left, the smaller of the two nerves, was much larger than usual, had it not been for the fact that the right was still larger. The difference in size having been noticed, of course further investigation was made to discover the cause.

Since seeing this case, now four years ago, one of us (Dr. Meigs) has seen another, which was in many respects parallel:

A man, aged forty-three years, who had always been healthy, was for a month annoyed by slight cough; but it was so slight that it had not prevented his starting on a long pleasure journey. Two weeks later found he had shortness of breath, which soon became so severe that he was advised to come home. When seen he was dull of intellect and his mind disposed to wander; he had dyspnoea, and the face was much con-

gested and swollen. There was marked nystagmus, and the eyeballs seemed prominent. In the supra-clavicular fossa upon the right side was a tumor. This was not very hard and seemed to be pressing upward from the chest cavity, so that it almost entirely filled the fossa. It did not pulsate. Examination of the heart brought to light no evidence of disease, as the sounds were soft and clear, but the action was rather feeble. There were whistling and cooing râles to be heard over the lungs, but no signs of consolidation. The appearance of the lower extremities was in marked contrast to that of the head. The patient was a large, stout man, and the swollen head and bulging eyes hardly looked as if they could be a part of the same individual as the legs, which were emaciated and shrunken. The history was that the tumor had existed only two weeks. This, taken in consideration with the fact that there had been severe dyspnoea for the same length of time, indicated strongly the presence of a rapidly growing intra-thoracic mass. Such a growth could only be a sarcoma, and the opinion was therefore expressed that the disease was mediastinal sarcoma.

It seemed almost certain, too, in the light of the other case that has been described, that the staring of the eyeballs and nystagmus must be due to an invasion of some part of the ocular apparatus by metastatic sarcoma. Within three or four days a tumor showed itself in the other supra-clavicular space, the dyspnoea increased terribly, and he died. A post-mortem examination was made, and a sarcomatous tumor weighing one and a quarter pounds was found occupying the mediastinum. The growth surrounded the trachea, aorta, and other large bloodvessels, and there were secondary deposits ranging in size from that of a bean to a chestnut upon the diaphragm and posterior wall of the thorax. The post-mortem examination does not appear to have been very thoroughly made, for there is no mention of metastases to any of the organs, though such almost certainly must have existed, nor was any investigation of the brain or eyes made. It is much to be deplored that sections from the eyes and their appendages could not have been thoroughly examined with the microscope, for the disease had almost certainly invaded them. That which was observed in this case, imperfect as the investigation was, when taken in connection with the more fully described one, makes it desirable that metastases to the ocular apparatus in cases of mediastinal sarcoma should be sought for. It may be, too, that it occurs in cases of sarcoma arising in other situations than the mediastinum. The presence of the sarcomatous deposits in the ocular apparatus might readily be overlooked, for there are hardly any gross appearances to be seen. It is reasonable to suppose that there was more sarcomatous deposit somewhere in the brain than that in the pia mater of the cerebellum which has been described, and which could only have been discovered by careful microscopical examination.

As already indicated, a large measure of interest centres in the distribution of the sarcoma cells within the eyes, optic nerves, oculo-motor (third) nerves, and the orbital muscles. Both third nerves are exten-

sively infiltrated throughout their length, especially upon the right side. In the branches of the nerves in the left orbit no exactly similar appearance was found, except in those supplying the inferior rectus, which, while not themselves infiltrated, are densely surrounded by cells. Again, in the right orbit, of the muscles apparently identified, a portion of the internal (or inferior) rectus is contaminated, as also are the nerves supplying it, not merely in the form of surrounding areas of cells, but also by a separation of the individual fibres with the elements of the new growth, exactly as this occurs in the parent stem. Therefore, if the appearances seen in the left superior oblique are not accepted as certainly sarcomatous, we may infer that one pathway of the morbid process was along the oculo-motor nerves, and through it to two, possibly three, of the muscles supplied by them.

The optic nerves within the skull are extensively diseased, but the process of infiltration grows less marked as they approach the eyes themselves. Indeed, even in the cross-section in the orbit scarcely any diseased tissue is evident, while in the portions of these nerves examined in connection with the posterior halves of the eyeballs, save for some slight cellular infiltration around the capillary vessels and in the intravaginal space, evidence of sarcoma is lacking. Therefore it may be inferred that a second pathway of the morbid process was *via* the optic nerves, and a striking and interesting feature of the case at once becomes apparent, viz.: that the disease was more advanced and extensive in degree within the skull than in the orbital and ocular termination of the third and second nerves. In other words, this indicates that the disease travelled along these pathways from the brain forward toward the eyes.

The deposits of sarcoma cells in each choroid, but particularly in that of the left eye, give this case importance in the literature pertaining to sarcoma of the uveal tract. The fact that these deposits are limited to a certain area of the choroid, that they are surrounded by comparatively healthy tissue not contiguous with infiltrations elsewhere located, and that the bloodvessels within them and in their immediate vicinity contain cells apparently of the same character, affords evidence that they should be regarded as metastatic nodules, probably of embolic origin.

Fuchs, in his admirable monograph, *Das Sarcom des Uveal Tractus*, Wien, 1882, having analyzed the entire literature to date, states that metastatic choroidal sarcoma is unknown, and quotes Virchow's well-known sentence: "Those organs which exhibit a great tendency to metastatic deposits." Fuchs refers to, but rejects, Broemser's case¹ of supposed metastasis of a melanotic growth of the cheek to the choroid, for the excellent reason that no microscopic evidence is at hand that either the ocular or the facial growth was sarcomatous, and reiterates his belief

¹ Ueber einen Fall v. secundär Melanom. d. Choroid. Diss. Inaug., Berlin, 1870.

that up to the date of his writing sarcoma metastasis to the choroid had not been observed.

Pflüger,¹ of Bern, contributes a case of sarcoma in a young woman, aged thirty years, which developed from a congenital nævus in the region of the right parotid gland, and which was followed by secondary sarcoma of the glands, with metastasis into the skin of the back and head, into the right choroid, and probably into the cerebrum. Three years and a few months elapsed between the period when the congenital pigment-patch began to enlarge and the death of the patient. Autopsy was refused, and the facts reported are based upon clinical observation alone. Ophthalmoscopic examination revealed a tumor occupying the medial half of the eye-ground. Pflüger refers to another case of intra-ocular metastatic sarcoma reported by Schiess-Gemuseus,² the primary growth being a sarcoma originating from a congenital nævus in the parotid region. Ophthalmoscopic examination was impossible, owing to opacities in the media, but the microscope showed that the secondary growth had originated from the optic papilla. Hence the case is not properly classed with choroidal growths.

In the case forming the basis of this paper unfortunately ophthalmoscopic examination is wanting, but the anatomical studies are sufficiently detailed to demonstrate secondary choroidal sarcoma. It is scarcely conceivable that the choroidal growth under these circumstances could have been the primary one, although, as is well known, in a few instances extremely small and totally unsuspected growths in this situation have been followed by very extensive metastasis; in one case, quoted by Fuchs, a melanotic mass was found in the heart secondary to a small sarcoma in a sunken eyeball, which had existed in this condition for more than twenty years.

Independently of the fact that the sarcomatous deposits in the eye were confined within the scleral walls, and were both clinically and microscopically of the nature of secondary growths, the mediastinum rarely suffers from this form of tumor, save as a primary growth. Among ninety-eight cases reported by various authors and collected by H. A. Hare,³ but five were secondary and thirty-one were primary, the remaining number having no distinct reference in regard to this point. The interesting fact has been noted that so far as the optic nerves, third nerves, and orbital contents are concerned, the microscopic evidence is that the disease travelled from the brain forward toward the eyes along these pathways, but the localized character of the choroidal neoplasms and their failure to be in any demonstrable connection with other sarcomatous areas, seems definitely to indicate that they should be regarded as embolic deposits.

¹ Archives of Ophthalmology, vol. xiv. p. 185.

² Graefe's Archiv, Bd. xxv., Abth. 2.

³ The Pathology, Clinical History, and Diagnosis of Affections of the Mediastinum. Fothergillian Prize Essay. Philadelphia, 1889.

REVIEWS.

THE YEAR BOOK OF TREATMENT FOR 1894. A Critical Review for Practitioners of Medicine and Surgery. By Twenty-four Contributors. Pp. viii, 492. Philadelphia: Lea Brothers & Co., 1894.

WHEN one reads this work he cannot but be impressed by the marked and substantial advances, which have been made in both medicine and surgery. To faithfully record these advances and in the selection of the material to discard the hasty generalizations upon insufficient data, to eliminate the optimistic conclusions of inexperienced observers, to make due allowance for dogmatism based upon preconceived notions, is by no means an easy task when one considers the enormous number of papers which are assumed to be contributions to medical literature. The practitioner will find many abstracts of articles which have been noticed in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES in the department of Progress, and with which he is already familiar, yet the work will have none the less of interest to him, for the time which has elapsed since their publication has brought them into a truer perspective, although, of necessity, the *résumé* cannot be brought down to so nearly the time of this writing. That the *Year-book* has filled a need of the profession is clear, for this is the tenth volume of the series, and the end of its first decade is noteworthy in that two new departments have been added—those of the Medical Diseases of Children and of Bacteriology. When the work has been so well done, the selection so careful, the editorial comments so fair, although at times incisive, it might appear ungracious to point out departments of especial merit. We believe, however, that the work of Dr. Dudley W. Buxton on "Anæsthetics" should be carefully studied by those whose practice brings them in contact with anæsthesia. Dr. William Hunter, in his review of "Bacteriology" in relation to treatment, gives an excellent *résumé* of the discoveries in the laboratory which have a practical bearing upon this new field of therapeutics—the tetanus antitoxins and the serum-therapy. The summary of the therapeutics of the years 1892-93, chiefly with reference to new remedies, by Dr. Walter G. Smith, is somewhat disappointing in that the recent candidates should have the fullest possible information presented rather than a mere outline. To be sure, much of such information will soon be rendered superfluous by the failure of many remedies to meet the expectations of their purposes, but the fuller the knowledge the earlier will be the demise of the useless drugs, and the sooner will literature cease to be encumbered with them. The selected list of new books, new editions, and translations does not include many works of importance which have appeared within the time specified; it is, however, a fair record. The painstaking labor which has been expended upon every page may not be apparent to the reader, but a careful study of this work will demonstrate its presence. We are

familiar with the various year-books, and while our judgment as to which are the valuable contributions to medical knowledge does not always coincide with that of the editors, we are firmly convinced that every practitioner should review his mental storehouse, should square his information with the general verdict of the profession, and thus remedy his deficiencies. Of all the yearly summaries with which we are acquainted we believe this to be the best, and we base this opinion upon the care shown in its compilation, the condensation of statement, the infrequent instances of repetition, the breadth of the field which is covered, the editorial comments, which are critical in the true sense of the word, and, lastly, but by no means of the least importance, the very excellent mechanical make-up.

R. W. W.

CHARAKA-SAMHITA. Translated into English. Published by AVINASH CHANDRA KAVIRATNA, Editor of *Susruta-Samhita*, with commentaries; Bengali and Hindi Translator of *Charaka-Samhita*, and of *Susruta-Samhita*; Editor of *Chikitsa-Sammitani*, etc. Parts IV.-VIII., pp. 89-248. Calcutta: D. C. Dass & Co., 1892.

ONE cannot read this translation of ancient medical lore but he must admit the close study, the logical deductions, and the concise generalizations of the sages of antiquity. When we consider the disadvantages under which they labored—chemistry and physiology yet unborn, anatomy almost an unopened book—crude practice must of necessity prevail. Botany was further advanced than pharmacy, but even that science was primitive as we understand it to-day. The first three parts, reviewed in an earlier number of *THE JOURNAL*, contained a list of remedies, many easily recognized as in use to-day. The fourth part commences with an enumeration of hygienic rules for the person and general rules of conduct, many of which are quaint, some deserve to be handed down as epigrams, and others appear to be trivial; all, however, possess a great interest for the scholar. In the succeeding parts the remedies, as applied to special diseases and conditions, are fully set forth, and one cannot be but impressed by the evidence of keen observation which is to be found on every page.

The lesson devoted to some of the diseases of the head is so full in the statement of the disease-causes that we scarcely imagine that we are reading a work more than twelve hundred years old. So, again, in the lesson upon swellings and inflammations, we find the important conditions clearly set forth. In the eighth part we find a classification of the diseases that usually occur—the accidental and constitutional; the relation of diseases depending upon their producing pain, their substrata, mind and body; their causes, and the kinds of drugs and operations necessary for treatment. The censurable faults of man physically are enumerated—excessive tallness, shortness, hairiness, baldness, darkness and lightness of complexion, obesity and leanness, the last two being of especial moment. The proper medicine for the particularly censurable ones is also indicated. This part also contains some sage observations upon sleep, together with the remedies for excessive and deficient sleep. The part finally closes with the six principal forms of treatment:

1. Langhana, that which lightens or attenuates the humors of the body.
2. Vringhana, that which promotes the nutrition and bulk of the body.
3. Rukshana, that which brings about dryness, roughness, or paleness.
4. Snehana, that which leads to secretion of oily matter, softness of the body, and increase of impurities.
5. Swedana, that which produces perspiration and destroys stiffness and heaviness and sensation of cold.
6. Stambhana, that which constipates or stops the motion of such constituents of the body as are liquid, restless, and endowed with motion.

These various treatments are thoroughly explained so that they can be understood. The translator is placing under obligation the entire medical world in presenting this excellent translation. Those of the younger generation of physicians are too likely to esteem as of little importance the learning and diagnostic acumen of the sages. A work like this is important not only for its showing our indebtedness to the fathers of medicine, but as well it is likely to be the starting-point of new discoveries, whose suggestion lies in the pregnant aphorisms and proverbial sentences of this work. We await the succeeding parts with interest.

R. W. W.

TREPHINING IN ITS ANCIENT AND MODERN ASPECTS. By JOHN FLETCHER HORNE, M.D. 12mo., pp. xii., 133. London: John Bale & Sons, 1894.

DR. HORNE has written a very excellent brochure in six chapters, which take up first the early literature of trephining and its modern application to diseases and injuries of the head and spinal cord, and then a brief summary in the succeeding chapters of the application of trephining to intra-cranial hemorrhage, abscess, cyst, tumor, epilepsy, paralysis, psychoses, and gunshot wounds of the head. A short chapter is given to trephining the spine, and the book closes with some general remarks on the technique of trephining. He shows that he has had, under Mr. Wheelhouse's excellent tuition at the Leeds General Infirmary, not only a practical training in surgery, but also a general acquaintance with the literature of this subject. There is but little in the book that is new to anyone who is familiar with recent cerebral surgery, but there are many to whom these pages will be a surprise, especially when they contrast the early literature of trephining as shown here, even down to the days of Bell and Petit, with our present methods.

In his introduction he makes a very pleasing allusion to his trans-Atlantic brethren, and says: "No apology is needed for the frequent references I have made to American surgery; I cannot but admire the genius and assiduity of the surgeons of that country, nor can we grudge them a large share of the honor for the great advances made in the department of brain surgery." We could wish, however, that he had always got the names of his American friends correctly. Thus, on page 104, the late Prof. S. W. Gross appears as "Gosse." On page 8, Detmold, of New York, is "Dutmold." In the footnote on page 78, Dr. Lamphear appears as "Lamphear;" while on the succeeding page, although he gives no reference to the writer mentioned, we suppose that "Kocker" is a misprint for Kocher.

There are introduced into the book a few cases which are of much interest, especially one on page 63, in which a man received a blow on the head with a sharp-pointed piece of iron on May 13th, walked three miles to his home, and had the bone removed on July 20th, nearly ten weeks after the injury, with complete recovery.

W. W. K.

CLINIQUE DES MALADIES DU SYSTÈME NERVEUX—M. LE PROFESSEUR CHARCOT. Leçons du Professeur, Mémoires, Notes et Observations pendant les Années 1889-90 et 1890-91, et publiés sous la direction de Georges Guinon, Chef de Clinique, etc. Tome II. Paris, 1893.

A SPECIAL and melancholy interest attaches now to any publication bearing the name of Charcot. It is but a few months since the death of the illustrious savant whose name is identified with that of the Hospital of La Salpêtrière, and whose publications, in such profusion, have at short intervals carried the fame of French neurology abroad.

The book before us is a continuation of one of those series of clinical studies which we had come to expect with regularity from Charcot and his assistants. Its predecessor was reviewed in these columns, and was notable for some very able papers in Charcot's best style. The present volume is given over rather too much to the collaboration of the great clinician's assistants, who have received an indulgence in space and opportunity which marks the generosity of the master toward those who have served him. This attitude in Charcot was always conspicuous, and to us in America, who know but little of the relations of master and assistant, was always rather striking. Not a little of his fame will rest upon the work that he inspired others to do; and it must always remain a proof of his strong personality and of his ability to impress this upon the minds of his disciples that much of their literary work has been received and applauded because the master himself shines through all their pages, and has almost invariably ennobled each of their books with the dignity of a preface.

On the whole, we do not find this volume quite so attractive and useful as was its predecessor. This may be due to the fact that we find fewer lectures by Charcot and more work by his assistants. In truth, the book is largely the work of Guinon and Sophie Woltke. The former has no reason to apologize for any of his excellent literary work, either here or elsewhere; but he is bound, perhaps, to suffer a little neglect when he publishes his papers under the same covers with Charcot. This is one of the penalties of associating with greatness. In the present volume there are but five lectures by Charcot.

The first of these is an elaborate study of a case of simple focal epilepsy caused by a circumscribed tubercular meningitis in the paracentral lobule in a case of advanced pulmonary tuberculosis. The author claims that this localization is in the adult a very common one for tubercular meningitis (in contrast with the basal meningitis of children), and that this fact is explained by the distribution of the bloodvessels in the part, which distribution conduces to great richness of supply with sluggishness of blood-currents. The paper is notable for its orderly arrangement of facts, for its fulness of details, for its clear intelligence, and for

its almost complete ignoring of the great work in localization done outside of France.

The one other of these lectures by Charcot himself that seems to us to be especially worthy of mention is the last, on hysterical hemianæsthesia and toxic hemianæsthesia. The author propounds two queries: first, Is there a saturnine hemianæsthesia arising directly from chronic lead-poisoning? and, second, Is there an alcoholic hemianæsthesia belonging properly to the nerve accidents of chronic alcoholism? As is well known, Charcot and his school answer these questions in the negative. The hemianæsthesia, both sensorial and sensitive, which is observed occasionally in cases both of lead and alcoholic poisoning, is not toxic but hysteric. The present lecture by Charcot is devoted to demonstrating this fact clinically, and hence to justifying this nosography. The patient, a young house-painter, had hystero-epilepsy, with hemiparesis, contractures and hemianæsthesia. He had also the gingival blue line, skin-discoloration and anæmia, but no history of wrist-drop, lead-colic, or arthralgia. Charcot differentiates the nerve-phenomena from lead-encephalopathy and from epilepsy, and proves their identity with hysterical manifestations. The lecture is the most important thing in the present volume. The French, almost exclusively, have recognized the toxic origin of hysteria, the symptoms of which, when observed in alcoholic and plumbic cases, have been confounded almost universally elsewhere with the effects of organic poisoning. This lecture will do much to make the subject clear to those who will take the pains to read it.

A valuable paper in this series is a review by Blocq, based upon lectures by Charcot, of the several forms of somnambulism. It has been apparent for some time that confusion exists in the use of the term somnambulism. Those who have followed the recent progress of studies in hysteria and hypnotism must have noted the frequent use of the term for describing a not uncommon stage of these disorders. It has been evident that the somnambulistic state of hysteria and hypnotism is something radically different from the ordinary somnambulism, or "noctambulism," which is seen occasionally as a disorder of sleep in otherwise healthy persons, and to which the term formerly was confined. Again, it has been recalled that a somnambuloid state is seen occasionally in epileptics, either as a substitute for, or as a sequel to, a fit. The necessity for a proper differentiation of these several forms has been evident, and in this paper M. Blocq meets the demand. Somnambulism is divided into two classes, the natural (noctambulism) and the pathological. The latter is again subdivided into epileptic and hysteric, which latter includes the hypnotic variety. The only fault we find with the paper is that the author finds it necessary at all to group these diverse states in one category. They are essentially distinct, and they are brought together only because they have been confused by a misuse of terms, especially in France. The somnambulism of healthy child-sleep is a widely different psychical state from the somnambuloid state of hypnotism, and this again from the automatism of epilepsy. There is no reason for grouping them together; all that is needed is the abolition of the term somnambulism as applied to any state either of hysteria or of epilepsy.

Guinon also furnishes in this book some valuable contributions to this subject of so called hysterical somnambulism. Then comes a lecture by Charcot on "*Vigilambulism Hystérique*," a term proposed by Egger

and Lereboullet for the *second state* in cases of double personality. This lecture by Charcot is an interesting discourse on this subject as illustrated by the history of a patient.

The book, perhaps, is devoted rather too largely to hysteria and hypnotism to suit the taste of some readers. When, however, we recall the services done by the French school in these studies, and the fact that Charcot is now no more, we cannot but read with interest and profit.

Among other valuable papers are one on the "Association of Tabes and Diabetes Mellitus," by Guinon and Souques, and another on "Conjugate Paralysis of the Sixth Pair," by Blocq and Guinon. J. H. L.

SYSTEM OF DISEASES OF THE EAR, NOSE AND THROAT. Edited by CHARLES H. BURNETT, A.M., M.D., Emeritus Professor of Otology in the Philadelphia Polyclinic; Clinical Professor of Otology in the Woman's Medical College of Pennsylvania; Aural Surgeon to the Presbyterian Hospital, etc. Vol. I., pp. 789. Philadelphia: J. B. Lippincott Co., 1893.

THE first volume of this "system" is divided into Part I., Diseases of the Ear, which embraces thirteen papers by different authors, and Part II., Diseases of the Nose and Naso-pharynx, which embraces ten individual papers.

The commendable purpose of the editor is to foster in theory and practice a more intimate association of these subjects—parts which bear to each other the closest anatomical and pathological relations.

The authors have been selected with much wisdom, and their essays are highly creditable, yet the *tout ensemble* is still suggestive of the dictum that aurists are prone to treat but incidentally the throat, and laryngologists but incidentally the ear, for in the distribution and assignment of topics the ear receives ideal and exhaustive consideration, while the department of the nose and naso-pharynx sometimes fails of that degree of completeness which one expects in a "system."

Dr. William S. Bryant describes admirably the "Anatomy and Physiology of the Ear," devoting nearly one-eighth of the entire volume to these subjects, and introducing sixty-five well-selected figures which assist in elucidating the somewhat intricate anatomy of this organ. The same author gives an excellent *résumé* of the various tests of hearing, and concludes that "after all, the voice and the watch are the tests one usually falls back upon."

Dr. Huntington Richards describes the various aural instruments, and the methods of using them, while Dr. Edward B. Dench writes on "Congenital Malformations and Diseases of the Auricle," following which is a chapter on "Otitis Externa," including a truly admirable article on "Otomycosis," by Dr. Robert Barclay. He describes no less than thirty-four parasitic fungi which are prone to dwell and establish inflammation in the external auditory canal, and appends a bibliographical synopsis which will prove invaluable to those who will endeavor further to identify and classify aural moulds.

Sir William Bartlett Dalby, in writing upon the subject of the removal of foreign bodies from the external auditory canal, says: "There are no difficulties worthy of the name, excepting so far as these are

created by the attempts at removal unwisely and unhappily made by those who are inexperienced in the examination of the ear." Dr. Gorham Bacon's contribution on "Diseases and Injuries of the Membrana Tympani" is illustrated by the recital of numerous cases, possibly tedious to some, but convincing to the many, and there are yet aurists who can profit by the same author's careful study of the etiological relationship of "adenoid vegetations" to acute otitis media.

Certainly no one more acceptable than Dr. Samuel Sexton could have been selected to present the subject of "Chronic Catarrh of the Middle Ear," for he represents a material advance in the treatment of this most persistent affection, that is, the operation of excision of the drum head and the two larger ossicles. The technique of this operation is briefly but plainly given, and is again described at length by Dr. Charles H. Burnett, the editor, in his personal article on "Chronic Purulent Otitis Media," with illustrations of the necessary instruments and of the electric forehead-lamp employed. Then follows the experience of Dr. Frederick L. Jack with the still more recent operation of removal of the stapes in chronic catarrhal and in chronic suppurative otitis media, with a description of sixteen cases in which uniformly good results were obtained so far as concerns the tests of hearing by ordinary and whispered voice.

Novel ideas may be gleaned from Dr. Christopher J. Colles' chapter, especially that part of it which relates to reflex relationships between the middle ear and dental, pharyngeal, and nasal affections. "Inflammation of the Mastoid Portion of the Temporal Bone," by Dr. Clarence J. Blake, scarcely receives as full and precise a treatment as the importance of the subject would seem to suggest; for instance, the operative measures for opening into the cranial cavity when necessary are accorded a space of less than one page.

Part II., Diseases of the Nose and Naso-pharynx, embraces chapters on "Anatomy" and "Physiology," by Dr. Alexander MacCoy; "Methods of Examination and Diagnosis," by Dr. Samuel G. Dabney; "Local Therapeutics," by Dr. Clinton Wagner; "Acute Rhinitis," by Dr. F. H. Bosworth, valuable for its plain statements concerning the proper regulation of the clothing and the use of the cold bath as prophylactics; "Influenza and 'American Grippe,'" by Dr. Carl Seiler; "Chronic Hypertrophic Rhinitis," by Dr. Ralph W. Seiss; "Cirrhotic (atrophic) Rhinitis," a masterly article, by Dr. John N. McKenzie; "Lupus, Tuberculosis, Syphilis, etc.," by Dr. George W. Major; "Foreign Bodies in the Nose and Epistaxis," by Dr. E. Cresswell Baber; and "Diseases of the Accessory Sinuses of the Nose," by Dr. Joseph H. Bryan—all admirable papers individually, but which, collectively, can hardly be accepted as composing a complete treatise on diseases of the nose and naso-pharynx. For instance, nasal polypus is disposed of in the space of eight lines under the title of "Hypertrophic Rhinitis," with an additional bare reference under "Disease of the Ethmoidal Sinuses," while nasal fibroma and the more common naso-pharyngeal fibroma are unmentioned. Again, the subjects of adenoid vegetations and of septal excrescence are but meagerly treated, and that within the scope of another title, while deviation of the septum narium also fails of any mention.

The volume presents an elegant appearance, being provided with good paper, clear type, and well executed illustrations.

W. E. C.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

REYNOLD W. WILCOX, M.A., M.D., LL.D.,

PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE
MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

BONE-MARROW IN THE TREATMENT OF PERNICIOUS ANÆMIA.

DR. THOMAS R. FRASER reports a single case where the curative effect was sufficiently evident to justify its publication. The patient was a man aged sixty years, suffering from frequent vomiting, diarrhœa, œdema pedum, moderate and irregular pyrexia, dyspnœa, and finally complete prostration. The hæmocytes varied from 1,860,000 to 1,460,000 per c.mm.; hæmoglobin 28 to 30 per cent. Ox bone-marrow was given by the mouth, uncooked, and in the daily quantity of three ounces. After twenty-seven days the hæmocytes rose to 3,900,000 per c.mm., the hæmoglobin to 78 per cent. The frequent failure of therapeutic measures in pernicious anæmia confers an interest upon any remedy which appears capable of controlling this malignant disease, even although the evidence is derived from one case only, and notwithstanding the fact that temporary improvement occasionally, though very rarely, appears to occur spontaneously. It is hoped that bone-marrow will be found to have a remedial value in some, at least, of these cases of pernicious anæmia.—*British Medical Journal*, 1894, No. 1744, p. 1172.

THE TREATMENT OF SPORADIC CRETINISM BY THYROID JUICE.

DR. GEORGE E. ANSON reports a single case treated for one year. A girl, aged ten years, of the size of a child of five, of good intelligence, but presenting the typical symptoms of the disease, received each day one lobe of sheep's thyroid, freely minced and eaten raw. As this amount gave rise to feverishness and violent vomiting, the treatment was discontinued for a week, then resumed with a piece of the thyroid equalling the size of a haricot-bean. Later a glycerin extract was used, being freshly made each time. During the year she gained four inches in height, her hair became thick and abundant, her skin natural and healthy, and the face has lost almost all trace of its former condition.—*Lancet*, 1894, No. 3687, p. 1063.

DR. TELFORD SMITH reports an instance of a boy aged twelve years who received not quite a quarter of one lobe of fresh sheep's thyroid minced and mixed with some warm rice and jam at tea-time. On the following day headache and vomiting set in, and he was depressed, pale and cold. Six days after the treatment was recommenced, with one-eighth part of the fresh lobe, and continued for about two months, the improvement being marked. During two months without treatment he began to revert to his former condition. He was now given a tablet, which is equivalent to one-twelfth of a lobe, and this treatment has been followed by success. After five months the improvement is very marked.—*British Medical Journal*, 1894, No. 1744, p. 1178.

DR. T. C. RAILTON reports the case of the older brother of the preceding. The treatment was commenced with thirty-six grains of raw thyroid, but as the first dose was followed by fever, vomiting, and restlessness, and the subsequent three by marked loss in weight, he was given two thyroid tablets of five grains each, and this number was gradually increased until the maximum of five was reached. The improvement in bodily growth and cerebral functions has been continuous; but time alone will determine to what point his mental development can be made to attain.—*British Medical Journal*, 1894, No. 1744, p. 1180.

THE ACTION OF EXTRACTS OF MUSCLES, ARTERIAL BLOOD, AND OF URINE UPON THE TEMPERATURE.

M. H. ROGER has carried out a carefully-conducted series of experiments, rabbits and dogs being used, from which he derives the following conclusions: 1. The extracts of the muscles contain thermogenic substances, while it is impossible to say whether these substances pre-exist in the tissues or originate during the manipulations which they undergo. 2. The entire arterial blood possesses a slight temperature-reducing property. 3. The entire arterial blood is sometimes thermogenic; this effect is noted when one takes it from a sick animal or exposes it to cold; in the latter case the thermogenic effect disappears when the animal is placed for twenty-four hours in a warm place, or when one has made a preliminary venesection. 4. Defibrinated blood, serum, and the exudates of pleurisy and of hydrocele produce elevations of temperature sometimes preceded by a slight lowering. 5. Urine causes a lowering of temperature, secondarily an elevation; this latter effect appears to be more marked when the subject which has furnished the urine has performed muscular exercise than when he has remained in repose.—*Archives de Physiologie*, 1894, No. 2, p. 216.

THE TREATMENT OF CHRONIC INTERMITTENT FEVER.

DR. SPIRIDION KANELIS, during the past ten years, has treated five hundred and twenty cases of this disease, and has cured them. The patient takes four pills every morning at half-hour intervals, each containing six grains of quinine sulphate, one-fiftieth of a grain of sodium arsenate, made up with extract of quinquina. These pills are taken every morning for two weeks, interrupted for a week, then resumed for a second series, and so continued during three months. Also for the same length of time before the mid-day and evening meals, a coffee-cupful of an infusion of five grains of quinquina

bark and five grains of the herb absinthium in twenty ounces of water, to which has been added about a drachm of dry extract of quinquina and two ounces of cognac. Two hours after taking the pills the patient drinks a glass of milk. For the mid-day meal he has good soup, beefsteak, eggs, etc., with old wine. In the evening the same diet, and he is advised to go to bed as early as possible.—*Bulletin général de Thérapeutique*, 1894, 14e livr., p. 325.

THE USE OF GUAIACOL FOR NEURALGIA.

M. FERRAND reports that he has made use of the analgesic action of this drug by painting it, mixed with an equal part of glycerin, over the surface in sciatica and intercostal neuralgias. He has obtained relief of pain without lowering of temperature or phenomena of collapse. He has found that there is some cutaneous absorption, inasmuch as the drug has been found in the urine, but in small quantity.—*Journal des Praticiens*, 1894, No. 30, p. 359.

THE TUBERCULAR DIATHESIS CONTROLLED BY GOLD AND MANGANESE IN COMBINATION.

DR. J. BLAKE WHITE has made use of these remedies for several years. He administers the gold and sodium chloride with manganese iodide, in five minims of a one per cent. solution of carbolic acid, hypodermatically, daily or upon alternate days. A second solution has been made, consisting of the above-mentioned remedies in combination with strychnine arsenate and tincture of gelsemium. The somatic changes effected by these remedies are exhilaration, restoration of functional activity of both the nutritive and respiratory organs, increased appetite, corrected assimilation, manifest amelioration of important symptoms. It is not easy to explain the exact action of these remedies, but he believes that gold, by preference, exerts its effect upon the lymphatic and glandular systems, exciting them to healthy action, thereby disposing of unhealthy exudations and promoting assimilation, which is in time followed by marked gain in body-weight and decided improvement in general health.—*American Medico-Surgical Bulletin*, 1894, No. 7, p. 388.

SOMMERBRODT'S CREOSOTE CAPSULES IN THE TREATMENT OF TUBERCULOSIS.

DR. W. THORNTON PARKER believes that creosote is the best local remedy; it controls the cough, it is healing to the diseased tissues, and it vigorously attacks the seat of the disease itself. If persistently and scientifically used to its full extent, it penetrates the system so thoroughly that it becomes a resident antiseptic. The capsules of Sommerbrodt (creosote and cod-liver oil) are admirably suited to the creosote treatment. For hygiene: nutrition, attention to the condition of the mouth, stomach, and digestive systems, regularity of the bowels, of the meals, wholesome cooking, simple but nutritious; freedom from care and worry, a wholesome and abundant water supply, suitable clothing, exercise, well-ventilated sleeping-rooms, well protected from the winds, sunny, bright, and with an abundance of pure air; hygiene of the person, bathing, friction with towels, a comfortable bed—should be

included in the painstaking effort systematically made to overwhelm the tuberculous poison.—*Notes on New Remedies*, 1894, No. 11, p. 163.

THE ANTISEPTIC TREATMENT OF TUBERCULOUS PHTHISIS.

DR. ARTHUR FOXWELL states that there are four main ends to accomplish : 1. The prevention of the entrance of the bacilli of tubercle into our bodies or into the bodies of domestic animals. 2. The destruction of the bacilli which exist in the waste products of the disintegration of tissue induced by their action. 3. The destruction of the bacilli which exist in the still living tissues. 4. Nullifying the septicæmia which results from the ptomaines and various pyogenic cocci, which arise as secondary products of bacillary life. The first means scrupulous disinfection of dwellings and articles of personal use of tuberculous patients, the forbidding of their marriage, the exposition of the wickedness of ubiquitous spitting. To obtain the second end, complete sterilization of the sputum is necessary ; also the sterilization of the excretion, before it leaves the body, by topical measures. The third end is the real one which we strive for in treatment. It may be attained by (a) endeavoring to make an antiseptic solution of the blood and lymph ; (b) increase the cardiac strength so that there may be a more vigorous circulation through the bacillary districts ; (c) enhance the respiratory interchange of gases, thus keeping the body as thoroughly oxygenated as possible ; (d) increase the nutrition of the lung parenchyma ; (e) increase the positive chemiotactic power of the bacilli, and also the capacity of the phagocytes for devouring bacilli. To nullify the septicæmia we must destroy the pyogenic cocci which cause it ; hectic should be treated upon the same principles as we treat pyæmia arising from other causes. Inhalation is the feeblest of all methods for administering antiseptic remedies to the lung parenchyma. Intra-pulmonary injection is extremely limited in its scope. Intra-muscular injection is no doubt the best way to reach the blood and lymph, and there is no lack of suitable solutions to administer it this way, but it is not a pleasant mode of administration. Of methods by way of the alimentary tract, the mouth is evidently the most convenient gate, but its use has the serious objection of sometimes causing gastric disturbance. The rectum has met this drawback, and most drugs can be well absorbed by it, and if given in suppositories not much objection is made by the patient, hence it is a valuable alternative to the mouth in those cases where gastric disturbance arises. The phenols have been more used than any other antiseptics. Pharmacy has now reached a step beyond the crude drugs, carbolic acid, creosote, and guaiacol, which, from their caustic, poisonous reaction and unpleasant taste, were very difficult of administration, and has passed to compounds, which, while harmless and tasteless, are almost equally powerful as antiseptics ; such are salol, betol, benzosol, paracresolol, guaiacol carbonate, creosote carbonate, and the group of bismuth phenols of which naphthol-, cresol-, and tribromophenol-bismuth are the most important. These phenols cannot be strictly termed antiseptics as regards living germs in the tissues, but there is good reason to believe that after absorption they combine with the albuminous toxins which result from germ life, forming non-toxic compounds which are eliminated in the urine as ethereal sulphates. They do not kill the bacilli, but

they obviate the evils resulting from the existence of these, and thus prevent injury to the tissues, the bacilli remaining harmlessly in the body, and in due course of time being excreted as effete material. There is no clinical proof of the extermination of the bacilli by the use of phenols, although there is ample evidence of the power they possess of keeping in check the evil symptoms of tuberculous septicæmia.—*The Birmingham Medical Review*, 1864, No. 189, p. 274.

THE TREATMENT OF CANCER OF THE STOMACH.

DR. H. HUCHARD cites among the anti-cancerous remedies, aristol, sodium chlorate and condurango. Aristol acts internally as does iodoform. Sodium chlorate diminishes vomiting, and hæmatemesis, increases the appetite and combats the cachexia; nevertheless it has no curative powers, and is contra-indicated in albuminuria. Condurango stimulates the appetite and the digestive power of the stomach when given as a wine or tincture or as a decoction. The diet must be regulated, hydrochloric acid administered up to the time of ulceration, then it must be replaced by pancreatin or pepsin. For the vomiting the choice of remedy must be made according to the emergency: morphine, cocaine, strychnine, lavage, gastric antiseptics, as sodium chlorate or salicylate, boric acid, naphthol, chloroform water, benzo-naphthol; nutritive enemata, as that of Leube, Flint, Dujardin-Beaumetz. The surgical treatment is not radical, for those operated upon succumb sooner or later to degenerative lesions of the mucous membrane inseparable from cancer; the patient dies; it is true that he dies cured.—*Journal des Praticiens*, 1894, No. 32, p. 379.

THE MECHANICAL TREATMENT OF CHRONIC CONSTIPATION.

DR. F. LE MARINEL believes that the mechanical treatment should be the treatment of choice in a large number of forms of chronic constipation. The manœuvres of massage comprise three forms—frictions, pressures, and percussions. In addition, various active and passive movements are undergone—flexion, extension, abduction, adduction, pronation, supination, rotation, and circumduction. The effects of medical gymnastics are studied as regards the circulation, respiration, animal heat, chemical phenomena, the muscles, bones and articulations, and the local results. The effect of massage upon the absorption, muscular system, nervous system, circulation, local temperature are fully recorded.

The technique of various authors is fully described and illustrated. The various forms of constipation which are likely to be benefited are—(1) from anæsthesia of mucous membrane; (2) from muscular paralysis; (3) from induration of the stools, and (4) from mechanical obstacle. The contra-indications are—(1) acute inflammation of intestines, peritoneum, peri-intestinal cellular tissue, or of intra-abdominal veins; (2) ulcerations (round, tuberculous) of stomach or intestines; (3) tumors of the alimentary canal (sarcomata, carcinomata, polypi); (4) voluminous fæcal masses of stony hardness. An interesting comparison is given of the value of diet, habit, purgatives, hydrotherapy, injections, electricity, various medicinal methods, with that described by the author, the general conclusion being that of all these

methods only one can be compared to the mechanical, and that one is electricity. But when one considers the question from the standpoint of success, massage shows figures which are not surpassed by electricity. So far as facility of application, massage is superior in that it does not require any apparatus, and can be applied equally well at the house of the patient as of the physician. Further, massage is better borne than electricity, and particularly by children. A series of 147 cases are reported, the treatment being that advocated in the paper. The care shown in the report, the apparent accuracy of diagnosis, the fulness of detail, give an especial value to the clinical histories. In the cases cited, those of the synoptical table, and eleven in detail, 158 in all, radical cure was obtained in about 90 per cent. The final conclusions are: 1. Mechanical treatment takes rank among those therapeutic agents whose action is most energetic upon the circulation, the respiration, and general nutrition. 2. It can modify the abdominal circulation, and cause certain foreign congestions, notably those which are met with in abdominal plethora, to disappear. 3. Under its action the muscles acquire an increase in volume and strength. 4. It is the best curative agent in constipation dependent upon muscular paresis or paralysis, if it is not of central nervous origin. 5. It is the best curative agent for constipation dependent upon diminished sensitiveness, or anæsthesia of the mucous membrane when it is due to local causes. 6. Finally, it is formally contra-indicated when constipation is due to acute inflammatory lesions or to tumors.—*Journal de Médecine, de Chirurgie, et de Pharmacologie*, 1894, fasc. 1 et 2, p. 1.

POISONING BY CHLORALOSE.

M. BARDET has seen poisonous symptoms produced in a child of six years who had taken only three and a half grains of the drug. In two hours there were trembling, convulsions, later a cataleptiform condition, which lasted two hours. On awakening from this, all symptoms disappeared. This trembling and intellectual stupor has been observed in adults also, by Morel-Lavallée, after a dose of twelve grains. This remedy certainly ought to be used with caution.—*Journal des Practiciens*, 1894, No. 15, p. 178.

INTRA-PERITONEAL INJECTION IN CHOLERA.

MR. ARTHUR POWELL has used an apparatus which can, if necessary, be improvised from the armamentarium of the general practitioner. It is a forty-ounce bottle with a rubber stopper, through which are passed two pieces of glass tubing—one short, just reaching the neck of the bottle. To this a canula is attached by about four feet of rubber tubing, such as is used for infants' feeding bottles. The other glass tube reaches nearly to the circumference of the bottom of the bottle, its continuation outside being bent at a more or less acute angle. Its object is to allow the air to enter when the bottle is inverted and in use. It may, if desired, have a thistle funnel attached to facilitate recharging and to hold some sterilized cotton to filter the air. The fluid—a drachm of common salt to a pint of spring water—is boiled, filtered into the bottle and then re-boiled with the cork and glass tubes in position. Before inserting the canula into the vein the bottle is inverted until the

opening of the long glass tube is above the surface of the fluid, which will then run with a force proportionate to the height to which the bottle is raised above the canula. A hypodermatic needle can be attached for subcutaneous injection, or an aspirator needle can be used for injection into the peritoneal cavity. It is hoped that these operations may be more frequently performed now that it is possible to extemporize so simple and effective an apparatus.—*Indian Medical Gazette*, 1894, No. 5, p. 168.

ERGOT OR HYDRASTIS IN METRORRHAGIAS.

DR. LIÉGEOIS believes that ergot is the remedy for *post partum* uterine inertia, but that hydrastis can be substituted with advantage in the treatment of metrorrhagias other than these. For chlorotics he prescribes ferric chloride or sulphate, but, with the iron, always hydrastis. For neurotic individuals the chloride or sulphate is replaced by the ferric valerianate or bromide and the hydrastis is continued, even during the menstrual epoch, because it does not give rise to uterine colic as does ergot. Neither ergot nor hydrastis can take the place of digitalis in cases where the hemorrhage is due to hyposystole in disease of the mitral valve of the heart; nor the place of quinine when it is due to malarial infection. Hydrastis is especially useful in the hemorrhages of the menopause; for the medication of urgency, hypodermatic injections of quinine are necessary. If uterine colic is a prominent symptom during the administration of hydrastis, the remedy is not at fault, but the cause lies in intra uterine clots, and relief may be obtained with piscidia and viburnum. In metrorrhagias connected with uterine neuralgias and metritis he adds, to the hydrastis, piscidia, and viburnum, cannabis indica. For the hemorrhage of endometritis fungosa, or of cancer, surgical measures must be adopted. If the uterine hypercongestion is secondary to ovarian neuralgia the combination above mentioned is useful. He does not recommend hydrastinine, for the dose varies so greatly, nor is it advisable for hypodermatic injections, which are always painful and leave behind indurated nodes.—*Journal des Praticiens*, 1894, No. 29, p. 344.

[The combinations of drugs recommended in this paper have been in common use in America for nearly ten years.—R. W. W.]

ICHTHYOL SUPPOSITORIES IN THE TREATMENT OF PROSTATITIS.

DR. A. FREUDENBERG has made use of this method of treatment in about thirty to forty cases since March, 1891. It is most useful in subacute and chronic cases, relieving the pain upon defecation, pressure, and other subjective symptoms, as well as the enlargement and hardening of the gland. The ammonium preparation was employed in dose from seven to fifteen grains in cacao butter, thirty to forty-five grains, as a rectal suppository, two being used each day. No observations upon prostatic hypertrophy are recorded.—*Centralblatt für klinische Medicin*, 1893, No. 26.

THE ACTION OF HYDROCHLORATE OF SCOPOLAMINE ON THE EYE.

DR. THOMAS R. POOLEY gives his experience of the last six months. Scopolamine is obtained from the root of the *Scopolina atropoides*, and like atropine

and hyoscine, belongs to the pharmacological group of the tropeïnes, and as such the instillation of a water solution in the eye causes dilatation of the pupil. According to Landenberg, scopolamine, as well as hyoscine, are contained in hyoscyamus, without being identical with the latter; it is rather isomeric with cocaine, but yields different integral products. The conclusions are: That it is of value as a mydriatic and cycloplegic in the examination of anomalies of refraction; that its action is more complete than homatropine, and of about the same duration, and better than that of atropine sulphate, because its effects pass off sooner; that it is open to the objection that it produces toxic effects oftener than homatropine, in spite of statements to the contrary; that the temporary amblyopia sometimes induced does not seem to be of much moment; that in cases of short attacks of inflammation of the cornea, especially in some of the suppurative types, it is of special value. That this drug will soon replace atropine in the practice of ophthalmology is not well assured, but that it may prove a very valuable addition to the list of mydriatics which we now have, seems to be altogether likely.—*Therapeutic Gazette*, 1894, No. 3, p. 160.

AN ANTIDOTE TO STRYCHNINE.

M. G. GRIGORESCU, in the course of some experiments to determine the action of toxic substances upon the excitability of peripheral nerves and muscles, developed the fact that butyl-chloral opposes the toxic action of strychnine. He found that if injections of strychnine were made (in frogs), those which received also the butyl-chloral remained torpid, while those with strychnine alone were tetanized; the least noise increased the tetanus of the latter, but the former did not show any spasm. After some hours the butyl-chloral was eliminated, and then these frogs were seized with tetanus, as were the others. On repeating the antidote up to the elimination of the strychnine, complete cures resulted. On experimenting with larger frogs similar results were obtained. The observations demonstrate that butyl-chloral energetically opposes its physiological action to the physiological action of strychnine.—*Archives de Physiologie*, 1894, No. 1, p. 32.

THE TREATMENT OF SKIN DISEASES BY THE MINERAL-OIL SOAPS.

DR. J. SÜMEGH has made use of a soap which, on account of its containing naphtha, he has termed a mineral-oil soap. This soap possesses great advantages over the tar ointments, in that it does not act as an irritant. He has employed it for pityriasis versicolor, herpes tonsurans, mycotic eczema, ephelis, acne vulgaris, and comedones. It is used in seven different degrees of concentration in the following manner: The diseased area is moistened with lukewarm water and the skin rubbed with soap. The foam thus produced is allowed to remain five, and later, when the skin is not markedly reddened, ten, fifteen, or twenty minutes, then it is removed by washing, and the area dusted with powdered rice starch. If the skin is markedly irritated, the treatment should be omitted for a few days.—*Centralblatt für die gesammte Therapie*, 1894, Heft 5, S. 271.

[Composition and strength of the preparation are not given.—R. W. W.]

MEDICINE.

UNDER THE CHARGE OF

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THE CONDITION OF THE REFLEXES IN CASES OF TOTAL PARALYSIS OF
MOTION AND SENSATION OF THE LEGS FROM AFFECTION OF THE
SPINAL CORD.

DR. E. REYNOLDS (*Medical Chronicle*) states that it is only within the last few years that particular attention has been given to this subject, thanks chiefly to the labors of Dr. Charlton Bastian, Dr. Hughlings Jackson, Dr. Thorburn, Dr. Bowlby, and others, and now it is fairly well recognized and accepted as a clinical fact, whatever the interpretation may be, that in cases of complete transverse lesion of the spinal cord the knee-jerks are lost.

Reynolds' two cases are published to illustrate the fact that a spinal-cord lesion may cause complete paralysis and loss of sensation of the legs without total loss of the deep or even superficial reflexes.

The first is that of a laborer, aged thirty-nine, who was injured by a fall. Ten months after the accident there was total paralysis of motion and sensation below the level of the seventh intercostal space.

"*Reflexes.* Although tested many times, there is a total loss of the knee-jerk and the ankle clonus on both sides. No epigastric superficial reflex can be obtained, but the side abdominal reflex is present on both sides, but is feeble. The cremasteric reflex is normal and slightly more marked on the right side. On touching lightly or pricking the inner side of either thigh, there is an exaggerated contraction of the adductor longus of the same side. On tapping either ligamentum patellæ there is a marked contraction of the hamstring muscles, with flexion of the knee on the same side. Although this at first looked like a peculiar deep reflex I found that the same contraction could be produced even to a more marked extent by pricking the skin over the patella, showing that the reflex was superficial in character. On touching lightly, or better, by a very slight pricking of the leg below the knee, and especially the sole of the foot, there was at once a marked and exaggerated dorsiflexion of the same foot, with a flexion of the knee from contraction of the hamstring muscles. This was so marked that if the prick was more severe the contractions spread across to the other leg, and both feet were drawn up."

Case II. is that of a girl, aged thirteen years, with marked lateral curvature of old standing (? caries) in the dorsal region, causing total paralysis of sensation and motion below the lesion (from sixth interspace downward).

"*Reflexes.* These I have examined on very many occasions, and have always found as follows: Knee-jerks and ankle clonus extremely exaggerated; side abdominal reflex present; plantar reflex intensely exaggerated, so that the slightest touch or prick of a pin causes the leg (or even both legs) to be at once drawn up. The epigastric reflex is absent."

Two other cases of total loss of sensation and motion, with retention of some reflexes are alluded to. (Thorburn: *Medical Chronicle*, May, 1892, and Charlton Bastian, *Hysterical or Functional Paralysis*, p. 66). The writer does not suggest that these were cases of total transverse lesion of the cord.

DISINFECTION OF ROOMS.

FOR the disinfection of poor lodgings, in which tuberculous patients had died, SHERIDAN DELÉPINE (Manchester) recommends solution of bleaching powder for the following reasons:

(1) The parts to be disinfected would necessarily be saturated with moisture; (2) chlorine, in the nascent state, would be generated where it was wanted, and much smaller quantities of disinfectant would be therefore sufficient; (3) there would be no necessity to use any complicated contrivance to secure the diffusion of chlorine, or to prevent its escape, though it might be well to keep the air saturated with moisture, to prevent the too rapid drying of the walls; (4) the assistants could apply the material without discomfort, and much less intelligence would be required on their part in the carrying out of their duties; (5) after the application of the solution, chlorine would continue to be evolved as long as all the chlorinated lime had not been decomposed, and that without anything further being required to be done after the first two or three hours; (6) the rooms would be fit for use as soon as dry again, and no poisonous substance would remain attached to their walls, as when perchloride of mercury is used; (7) if necessary, it was easy to increase its activity by adding acids to the solution, or by saturating the air of the rooms with acid fumes, and raising the temperature for a few hours."

Three series of experiments to demonstrate the efficacy of this method yielded entirely satisfactory results. The method of procedure recommended is as follows:

1. A solution of chlorinated lime (1 to 10) should be prepared. 2. The walls, ceilings, and floor should be washed with this solution, applied in the same way as lime or whitewash is usually applied. 3. This process should, for safety, be repeated three or four times in succession. By starting each time at the same corner of the room each layer would have time to penetrate into the paper and partly dry before the next is applied. 4. The room should then be closed as well as possible, a small, safe petroleum stove being first placed in the middle of the room, precautions being taken to prevent any chance of fire. Over this stove a large tin basin, full of water or chlorinated lime solution, should be placed. (By a simply devised water-bath arrangement a small capsule full of strong acetic acid or hydrochloric acid might be

placed over the boiling water, and in this way acidity of the air would be secured. This would cause a more rapid setting free of chlorine.)

"Chlorinated lime itself does not spoil things as much as one would expect, and can be used as indicated in rooms from which all hangings and carpets have been removed without any fear of damage, provided the walls and ceilings are not decorated with valuable paintings or papers. In the poor dwellings it is evident that this is not an obstacle to its use.¹ Small petroleum stoves, perfectly safe and giving much heat, can be obtained for a few shillings, and large tin dishes for a few pence."—*Medical Chronicle*.

THE STARTING-POINTS OF TUBERCULAR DISEASE IN CHILDREN.

In the *Lancet*, No. 3689, 1894, WALTER CARR (London) communicates a paper on this subject, founded on the results of one hundred and twenty necropsies, and draws the following conclusions:

1. That tuberculous disease commences usually in the glands, the liability being at its maximum during infancy.
2. That tuberculous lesions in the cervical glands—as in the joints—might arise by infection through the blood stream, but that caseation of the bronchial and mesenteric glands, when primary, is usually, if not always, due to direct infection from the organ with which they were connected.
3. That tuberculous disease starts much more frequently in the thorax than in the abdomen.
4. That caseation of internal glands, from the frequency with which it is found after death, must have often existed alone and quite unsuspected.
5. That in regard to treatment, prophylaxis is by far the most important.

A CASE OF PANCREATIC COLIC.

MINNICH (*Berliner klinische Wochenschrift*, 1894, No. 8, p. 187) has reported the case of a man, sixty-eight years old, without hereditary predisposition and with a good personal history, who at the age of forty became troubled with attacks of hepatic colic, which were attended with icterus and continued during a period of three months, but disappeared upon appropriate treatment. In the stools were found typical biliary calculi. There then followed a period of freedom from attacks for ten years and a half, when attacks of colic recurred; and these again yielded to suitable treatment. Some seventeen years later the man was suddenly awakened at night by an attack of colic resembling previous attacks. A second attack took place on the next day and a third several months later. At this time there appeared a sense of oppression in the epigastrium, together with loss of appetite and distaste for fluids. This condition persisted for about a month, without the occurrence of an actual attack of colic. At the end of this time the man was seized with diarrhœa, lasting for three days and ending with an attack of colicky pain referred to the left hypochondrium and to the epigastrium. The patient was well nourished and presented no œdema. The scleræ were a little yellowish and the skin dry and of normal warmth, but not icteric, although the seat of annoying itching and a chronic desquamative eczema upon the exterior sur-

¹ The quantity of bleaching powder required for a room measuring ten feet in all dimensions would not be more than six ounces, and the quantity of water three pints.

faces of the arms. The temporal arteries were slightly tortuous, but there was no other evidence of arterio-sclerosis. There was an absence of abdominal tenderness, so that deep palpation could be practised, but without yielding positive information. The liver was not enlarged, and the gall-bladder could not be appreciated. The spleen was likewise not palpable, and the area of splenic percussion-dulness was not increased. There was no evidence of dilatation of the stomach, and a peritoneal effusion could not be detected. The patient described the paroxysm as beginning with a sense of dull, heavy, constricting pain above the epigastrium and in the left hypochondrium, increasing in intensity and localizing itself deeply in at one point below the left costal margin just within the mammillary line. At the height of the attack the pain extended from this point circularly to the vertebral column in the course of the costal arch, thence radiating beneath the left scapula. At the termination of the attack pain was still perceptible at the point below the costal margin in an area about an inch and a half in diameter. Careful exploration of this region failed to disclose any morbid condition, excepting slight tenderness. The attack abruptly came to an end at the expiration of two hours, and was followed by a sense of hunger. The urine passed at this time was free from albumin and sugar, and did not respond to tests for biliary coloring-matter. From this time the attacks were repeated almost daily, usually setting in toward the end of the day and lasting from a fraction of an hour to several hours. The condition resisted the ordinary treatment for hepatic colic. An examination of the stools failed to disclose the presence of fat or fatty crystals or biliary calculi. On several occasions, however, light-gray, round calculi were found, which could be crushed between the fingers and microscopically proved to be constituted of amorphous matter. They dissolved in chloroform, leaving a turbid solution. They fused in the flame, giving off a dense vapor having an aromatic odor. The residue yielded the reactions of calcium carbonate and calcium phosphate. Subsequent attacks of pain occurred, but no more calculi or other abnormal matter was found in the intestinal evacuations. The condition was diagnosed as one of calculous formation resulting in obstruction of the excretory ducts of the pancreas and giving rise to attacks of colic.

RECURRING SYMMETRICAL LOCAL ASPHYXIA IN A YOUNG CHILD.

ISRAELSOHN (*St. Petersburg medicin. Wochenschrift*, 1894, No. 16, p. 147) has reported the case of an anæmic and rhachitic child, three years old, that he was called to see on account of a deep-blue, almost black, discoloration of the fingers and toes of both hands and feet, of sudden onset. The discoloration extended from the tips of the fingers and toes to the wrist-joints and ankle-joints respectively, there terminating sharply. The affected extremities felt cold. The condition had existed for twenty minutes and had set in without appreciable cause, the child previously having been bright and cheerful. Consciousness was not affected, although the child appeared languid and apathetic. The heart-sounds were distinct, rhythmic, and pure. The radial pulse was 80 in the minute and small. The lungs presented no abnormality. A year before this attack the child had suffered with generalized œdema, without albuminuria, however, and this was attributed to the

anæmia. The condition disappeared in the course of a week upon a milk-diet, leaving anæmia and weakness. For the relief of the cyanosis frictions with spirit of camphor were directed, and in a short time the discoloration had disappeared. Two days later a precisely similar attack occurred, which again disappeared after friction with camphor-spirit. Four other attacks took place at intervals of two or three days, always soon subsiding under the influence of the frictions. It was observed, however, that the cyanosis in the lower extremities yielded when the friction was applied only to the upper. The case is believed to belong in the category of those described by Raynaud and known by his name, and in which the primary stage of local syncope escaped observation and the third stage of gangrene was averted. No importance is attached to the therapeutic measures employed, as it is believed that the paroxysms came to an end spontaneously after the spasm of the vessels from irritation of the bulbar vasomotor centres had relaxed.

THE EFFECT OF COMPRESSION OF THE COMMON CAROTID ARTERY.

HILL and MOORE (*British Medical Journal*, No. 1740, p. 962) found that on compressing the left common carotid artery there resulted at once sensations of formication and tingling, spreading down the right side of the body and accompanied with feelings of vertigo. A repetition of the experiment was followed by half a dozen clonic spasms of the right hand, which at the time lay upon the arm of a chair. The hand felt passively moved as if by some external agent, and consciousness of the spasms arose only from the peripheral sensations produced by the movement. The experiment was followed by vertigo and nausea lasting for some minutes. On compressing the left carotid against the spine at another time an undefinable sensation, as of numbness and prickling, arose in the left eye; this was followed by a distinct and rapid march of formication and numbness down the right arm, right leg, and then up the left leg. At this point the compression was withdrawn; the sensations, however, increased in intensity in the right hand, drew the attention to that part, and then the hand was felt to be passively twitched three or four times as if by some external agent. Nausea and vertigo followed and lasted for some minutes, and an acute feeling of dread of touching the region of the carotid again lasted for some days. In another experiment some difficulty was at first experienced in compressing the artery, and the first symptom produced was a succession of inspiratory spasms, which very probably were caused by stimulation of the vagus. Sensations in the eye of the same side followed and then three or four flexions of the left hand and fingers, which were at the time lying upon the knee. At the same time there was pallor and sweating of the face. The hand was felt to be passively moved by some external agent, and consciousness of the movement arose entirely from peripheral sensations. Vertigo and nausea followed. It is pointed out that the interest of these observations resides, first, in the realization of the intensely sensory side of consciousness. In all three of the experiments consciousness of the resulting movement arose entirely from the centripetal sensory impressions which had origin in the moving part. The central motor discharge was unaccompanied by any simultaneous consciousness of that discharge. Only the sensory part of the sensori-motor process

was accompanied by consciousness. Consciousness of peripheral sensations arose, first of all, as an illusion from the central stimulation due to the sudden anæmia; and secondly, from the real peripheral sensations due to the "passive movements" of the arm. In the second place, the experiments demonstrated the sensori-motor functions of the regions of the brain supplied by the middle cerebral artery. Finally, they fortified the teachings as to the origin of spasm in man from pathological changes in this region of the cortex.

PARALYSIS AGITANS IN A YOUNG PERSON.

LANNOIS (*Lyon Medical*, 1894, No. 14, p. 465) has reported the case of a lad, eighteen years old, without neurotic predisposition, who from the age of twelve years, following an attack of measles, presented tremor, at first slight, but slowly progressive. The appearance of the lad was strikingly juvenile; his height and his general aspect, as well as his intelligence, were those of a child of twelve years. The face was round and fixed; both it and the pubes presented no indication of a growth of hair, while the genitalia were like those of a boy. There was no deformity of the head or curvature of the spine and no defect of the teeth. In walking the left leg appeared shorter than the right, but upon measurement no difference in length between the two was found. The tremor was regular and rhythmical and was most marked in the upper extremities, which were shaken in their entirety. The hands and the fingers, or the thumbs and fingers brought in apposition, were involved in rapid, tremulous movement, occurring from eight to nine times per second. The tremor was increased by emotion, by observation, and by exposure to heat or cold. It continued during repose, but ceased during sleep. It was lessened but not entirely subdued upon voluntary movement. The handwriting was exceedingly irregular. The tremor was evident in the lower extremities when the lad was recumbent. With the feet together the station was steady. If, with the patient in this position, the hands were placed upon the shoulders, a slight general shaking of the whole body could be felt, and this was transmitted to the head, but the head was not shaken independently; it was not moved when the patient was recumbent. There was no tremor of the chin, of the tongue, or of the ocular muscles. In walking or standing erect a characteristic attitude was assumed; the head was held fixed, the neck was slightly turned to one side, the trunk was inclined a little forward, and the arms hung by the side of the body, with the hands in supination and the thumb in apposition with the fingers. The movements in the fingers were intensified after the patient had been in this position for a short time. Complaint was made of a sense of heat and of undue perspiration, particularly at night. Speech was slow, but otherwise unaltered. Sensibility, in all its varieties, and the reflexes were intact.

SYRINGOMYELIA WITH BULBAR SYMPTOMS.

MÜLLER (*Deutsches Archiv für klinische Medicin*, B. lii., H. 3, 4, p. 259) has reported the case of a metal-moulder, eighteen years old, without neuropathic predisposition, who, three years before coming under observation, was seized with vomiting, in the absence of assignable cause. The vomiting continued for three or four weeks, often being repeated several times daily, but finally

ceasing spontaneously. Some four months later some difficulty was noted in grasping and holding objects with the right hand, and this was the more marked when the hand was not in sight; there was also some defect in recognizing objects by touch. Some time after this a sort of numbness appeared in the right lower extremity. After the lapse of eight months headache would frequently occur, of variable intensity and duration. Then vertigo became manifest, particularly on looking upward and when lying recumbent. Difficulty in deglutition set in a short time later. Solids were swallowed with difficulty; liquids returned through the nostrils. There was at no time fever. Dyspnoea occasioned some distress. The patient continued at work for thirteen months after the appearance of the first symptoms; then he was compelled to stop on account of the vertigo, difficulty of gait, and diplopia. At this time it was said the face was distorted, the right eye turning inward. There was a sense of loss of control of the right lower extremity, which felt as if it were attached to the trunk by artificial connections. Some improvement now followed, inasmuch as the patient was able to walk better and for a longer time. When held dependent there was some formication in the fingers of the right hand and in the arm. Shooting pains were felt upon the whole right side of the body, compared by the patient to electric shocks. There was evidence that the appreciation of position was lost in the right hand, for when an attempt was made to reach this member with the left hand the former was not found in the position in which it had been thought to be. For a month there had been a disagreeable sensation referred to the left upper extremity, most nearly comparable to a sense of heat. This extended up over the neck to the ear. For a month, too, there had been some difficulty in flexing the fingers of the left hand. The little finger was additionally abducted, and from time to time was involved in involuntary movements of flexion. Wasting and hardness of the ball of the left thumb had been observed. There was no history of alcoholism, infection, or abuse of tobacco, and none of traumatism or of undue exposure to cold. The only cause suggested by the patient for his condition was excessive muscular effort in his work. He had repeatedly burned himself without pain and without consciousness of the occurrence except from the presence of blisters. There was nasal deviation of the right eye, from paralysis of the sixth nerve. The pupils were equal and reacted to the usual stimuli. The fundus presented no lesion. The nasal half of the visual field of the right eye was defective, from the internal strabismus. The muscles supplied by the right facial nerve were paralyzed; the electric reactions were unaltered. In the distribution of the trigemini, both the temperature-sense and the pain-sense were impaired, though common sensibility was preserved. The right half of the velum pendulum palati was paretic. Speech was nasal. The right recurrent laryngeal nerve was paralyzed, as indicated by the cadaveric position of the corresponding vocal band. The reflex irritability of the epiglottis, the ary-epiglottic folds, and the interior of the larynx was much diminished, although sensibility was preserved. The right half of the tongue was smaller and less active than the left, and was the seat of fibrillary tremor; its electro-contractility was diminished; when the organ was protruded it deviated to the right. Reflex irritability of the uvula, the root of the tongue, and the posterior wall of the pharynx was lost. The spinal column was deviated to the right in the dorsal region.

There was a sense of itching in the interscapular region. The thenar and hypothenar eminences, and the interosseous spaces were wasted. Gross power seemed to be alike in both hands. Fine movements were not performed with the right hand so well as with the left, and less well when the eyes were closed. A similar defect of co-ordination was present in the right lower extremity. Jerky, irregular twitching movements occurred in the right upper extremity when hanging dependent and not kept in sight. A similar condition existed in the right lower extremities. From time to time rapid movements of flexion would take place in the little finger of the left hand. There would also occur attacks of pain radiating from the right side of the neck to the fingers of the right hand. The entire left upper extremity was the seat of a peculiar, uncomfortable feeling extending over the left side of the neck to the ear, and compared by the patient to a sense of heat. All forms of sensibility were impaired, and there was analgesia in an area occupying the right side of the neck, the right shoulder and arm, and the upper part of the chest on the right side, while in a corresponding area upon the left side the temperature-sense and the pain-sense were lost. Below these areas to the level of the nipples the temperature-sense only was lost. There was analgesia, together with inability to distinguish sharp and dull points in the right hand and fingers, and the sense of localization was also defective. The appreciation of both active and passive movements, as well as the sense of position and the sense of weight, was defective upon the whole of the right side of the body. There was an inability to recognize objects with the right hand by means of touch alone, without the aid of the vision. The limits of the areas of thermo-anæsthesia and analgesia were bounded by zones of thermo-hypæsthesia and hypalgesia respectively. Electro-sensibility was impaired in the right upper extremity as compared with the left. The gait was ataxic, the station unsteady. A subcutaneous panaris that formed on the little finger of the left hand was incised without causing pain. The reflexes in the lower extremities were exaggerated. While under observation some of the symptoms remained stationary, while others underwent varying degrees of improvement.

INFECTIOUS PURPURA.

AT a recent meeting of the Société Médicale des Hôpitaux, LEBRETON (*La Médecine Moderne*, 1894, No. 8, p. 126) reported the case of a girl, eighteen years old, who, forty-eight hours after violent emotion, presented grave general symptoms: intense headache and backache, chills, fever, and repeated epistaxis. Twelve hours later there appeared upon the hands, the arms, the thighs, purpuric spots of confluent arrangement, and so numerous as to leave scarcely an area of clear skin. Upon the body, however, the eruption was discrete. During a period of forty-eight hours the condition appeared alarming, and ether and caffen were injected subcutaneously and oxygen administered by inhalation. The spleen was enlarged and the periphery of the body was cold. In the course of several days the threatening symptoms gradually subsided, and recovery finally took place. Cultures prepared from the blood and from the urine with suitable precautions disclosed the presence of the staphylococcus pyogenes albus. The portal of entry of the micro-

organism was, however, not evident. Neither the patient nor those about her presented any suppuration, or furunculosis, or impetigo, nor she herself an angina. In the discussion WIDAL pointed out that, as in other cases of infectious purpura streptococci and pneumonia-cocci had been found as well as staphylococci, the question arose if the presence of these might not be secondary to some primary infection. MATHIEU called attention to the possibility of mistaking for hemorrhagic variola such a condition, attended with a copious purpuric eruption and profound constitutional symptoms. Furthermore, in the absence of a bacteriologic examination, the case, following emotional disturbance, would have been considered one of neuropathic origin.

THE RESULTS OF PROGRESSIVE TRANSPLANTATION OF THE THYROID GLAND IN THE DOG.

GODART (*Journal de Méd., de Chir., et de Pharmacol.*, 1894, No. 4, p. 49), as the result of a rather extended series of experimental observations, concludes that the symptoms observed after removal of the thyroid gland are not to be explained upon the supposition that the normal gland exercises a regulatory action upon the circulation. Nor is there support for the belief that the abnormal manifestations are due to a lesion of the nerves of the gland or adjacent to it. An adequate explanation of the symptoms is, however, to be found in the loss of the cellular activity of the gland, as demonstrated by the results of grafting or transplantation. The unpleasant results that follow thyroidectomy are to be avoided by inserting grafts before the removal of the gland, and by making this removal gradual and not abrupt.

SURGERY.

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THE CURATIVE EFFECT OF EXPLORATORY LAPAROTOMY.

SHEPHERD has added another to the now rather extended list of cases in which simple exploratory incision has been followed by marked amelioration or cure of apparently grave conditions (*Montreal Medical Journal*, 1894, No. 9). Many such cases have been recorded by reliable authors. The explanation of the beneficial results following exploratory operations must for the present remain problematical, and has been carefully avoided by most authors. In

1891, White collected a large number of these cases (*Annals of Surgery*). In this paper he suggested that the effect of the anæsthetic, psychical influence, relief of tension and reflex action, might be possible factors. The cases are too numerous to be attributed to accident or coincidence.

The author's case was that of a woman, aged twenty-eight years, with a tumor in the neighborhood of the umbilicus. Her morning temperature was 100°, and the evening temperature 101°. Every second day she had a severe sweat. The growth was about the size of an orange, smooth, tender, and movable with the respiration. The nature of the tumor was difficult to determine, as there was nothing in the history bearing on the affection. At the operation the tumor was found to be connected by a broad base. It was decided not to remove the growth. The wound was closed and the patient made an uneventful recovery. After the exploratory incision she had no more tenderness, and after the first day or two no more pain. The sweating ceased and the temperature became normal. The tumor disappeared within a year after the operation, and the patient continued in perfect health.

PARALYSIS OF THE SERRATUS MAGNUS AND DISLOCATION OF THE SCAPULA.

MOORHOUSE (*British Medical Journal*, 1894, No. 1726) records the following rare case: A miner complained of pain in the region of the deltoid and right side of the chest. The symptoms disappeared by rest. The pain returned again, however, and the shoulder-blade was growing prominent. Examination revealed two painful spots—one behind the deltoid muscle, corresponding to the position of the circumflex nerve, and the other to the inner side of the biceps. The pain was only marked when he held the forearm out between pronation and supination. With the arms hanging at the side, the lower angle of the right scapula was half an inch nearer the spine than the left. With the arms stretched out in front, the right scapula came out like a wing, to such an extent that the dorsal border was two inches from the chest wall. The distance between it and the spine was only two and one-fourth inches as compared with five on the left side. The left arm could be stretched out an inch and a half further than the right, and the affected side was very weak. A curious feature was that when the place of the serratus magnus was supplied by pushing the scapula forward against the chest the pain ceased. The right shoulder was lower than the left and the deltoid considerably atrophied. The right half of the chest moved much less than the left on forced inspiration. It would seem that there was some affection of the circumflex and posterior thoracic nerves, the paralysis of the posterior thoracic nerves having been followed by the characteristic dislocation of the scapula. No cause could be given. Under the influence of a tight belt, fly-blisters, stimulating applications, and hypodermatic injections of strychnine into the muscle, recovery was complete at the end of two months.

THE TREATMENT OF PERITONITIS BY DRAINAGE.

BARLING records (*British Medical Journal*, 1894, No. 1725) the histories of ten cases of peritonitis treated by drainage. These include cases of acute sero-purulent peritonitis, purulent peritonitis, and tuberculous peritonitis.

Although four of the patients died, the author considers the results satisfactory.

While the diagnosis of peritonitis is usually easy, cases are occasionally met with which are very misleading. Instead of the constipation generally present, there may be diarrhoea; instead of a hard wiry pulse, it may be soft and dicrotic; distention and tenderness may be absent. The most reliable signs in the author's experience are the steadily increasing frequency of the pulse, often with a low or falling temperature, and the facial expression, this being either pinched and anxious or flushed, the latter usually being associated with delirium. In many cases the phenomena are those of septicæmia, which mask and obscure the symptoms immediately due to the inflammatory process in the peritoneum. These latter are pain, shock, paresis of the bowel, and a hard pulse, and are mainly produced through the impression made on the widespread sympathetic plexuses of the abdomen by the inflammation which envelops them. It is worth noticing that the umbilicus seems to be the point at which inflammatory collections naturally find their way out, if they are general.

ASEPTIC AND SEPTIC SURGICAL CASES WITH SPECIAL REFERENCE TO THE DISINFECTION OF SKIN, SPONGES, AND TOWELS.

LOCKWOOD has added another contribution to this subject (*British Medical Journal*, 1894, No. 1726). This paper is a continuation of two previous reports which appeared in the issues of the same journal of October 25, 1890, and May 28, 1892. The investigations have been conducted on the same line as laid down in those communications. The difficulty of rendering the skin sterile, as has been so often remarked upon, is emphasized by the present investigations. In a number of operations the skin was disinfected with the greatest care, after the most approved modern methods, including vigorous scrubbing with soap and warm water, followed by carbolic lotion 1:20, bichloride lotion 1:1000 and 1:500, solution of potassium permanganate and solution of oxalic acid; notwithstanding, small portions of skin dropped into culture-tubes invariably resulted in the growth of one or more of the various bacteria which infect the skin. Some of the operation wounds, however, ran a sterile course. The comparative inefficiency of corrosive sublimate and carbolic acid to inhibit bacterial growth was demonstrated by mixing solutions of these chemicals, in different proportions, with broth cultures, and it was found that inoculated colonies continued to grow in these media. The failure of watery solutions to penetrate the pores of the skin has been recognized for some time, and an effort made to overcome this defect in the technique by employing alcohol, ether, or benzine. In view of this fact the author was induced to employ glycerin as the vehicle for applying the chemical antiseptic. Accordingly bichloride in glycerin 1:2000, and carbolic acid in glycerin 1:40, were applied after the usual preparation of the skin, twenty-four hours before operation. This plan was more successful. In about half of the cases test-tubes inoculated with fragments of skin so prepared remained sterile. Inasmuch as biniodide of mercury is not precipitated by albumin, it was thought that this substance might yield more satisfactory results. Of two trials, however, the skin was found by culture-

experiments to have been aseptic in one and to contain staphylococcus albus in the other.

Of 21 experiments upon the disinfection of the skin which have been carefully detailed, 7 were successful—in 6 the wounds healed by first intention, without either local or constitutional reaction. In 14 of the cases the skin was septic—9 of these healed by first intention and 5 suppurated. In none of these, however, was the suppuration severe or prolonged.

In regard to disinfection of the hands, the author states, the best results have followed the usual thorough scrubbing with soap, hot water, and nail-brush, cleansing the nails and then immersing for one minute in a 1:1000 solution of sublimate in alcohol.

The observation on the disinfection of towels is interesting: Three of four towels which had been soaked for two hours in 1:20 carbolic solution were found to contain staphylococcus pyogenes albus. In another case a towel which had been kept in carbolic solution 1:25 for twenty hours grew a bacillus. In another case a towel which had been immersed for twenty-four hours in a solution of the same material was sterile. The result of the use of bichloride was also not uniform. Of 6 experiments in sterilizing towels by the steam sterilizer for a half-hour, 5 were successful and 1 failed. The latter was attributed to the towel having been tightly folded during the sterilizing process. By taking the precaution of placing the towel loosely in the sterilizer, the author believes this method may be relied upon; the towels being kept, of course, in antiseptic solutions after being taken from the sterilizer.

The sponges were prepared as follows: If new they were well shaken, then soaked in a solution of hydrochloric acid (1 drachm to a pint) for twenty-four hours. Next they were thoroughly washed and squeezed out in water at the temperature of 100° F.; and then immersed in a cold solution of sulphurous acid (1:5) for twelve hours, being kept below the surface of the water. Lastly they are squeezed as dry as possible and placed in carbolic solution 1:20, ready for operation. Of 12 experiments with sponges so treated, 11 were found to be sterile, the failure having occurred when the process was carried out by an inexperienced person. As carbolic acid evaporates rapidly, the jars containing the sponges must be tightly stoppered. These experiments show that asepsis is with the greatest difficulty obtained by the use of chemicals, but once secured, either by this means or by heat, dilute solutions of chemicals suffice for its continuance.

OPERATIVE INTERVENTION IN ANURIA OF CALCULOUS ORIGIN.

DEMONS and POUSSON have collected (*Annales des Maladies des Organes Génito urinaires*, 1894, No. 2) from literature, fifteen cases of calculous anuria which were subjected to operation, to which they add three cases personally observed. Of the eighteen cases, six died—a mortality of 33½ per cent. This compares very favorably with those treated expectantly. Legueu places the mortality at 71.5 per cent. in cases treated without operation.

The authors conclude that calculous anuria indicates operation as urgently as does intestinal obstruction. The calculus must not be attacked, however, from in front. The uncertainty regarding the exact location of the obstruc-

tion contra-indicates this course. The creation of a means of escape for the urine above the obstruction greatly enlarges the field of action. Access to the renal pelvis is to be obtained by an incision through the convexity of the kidney. This operation, being so simple and free from danger, is to be preferred to ureterotomy or pyelotomy, unless the location of the calculus has been accurately determined. Calculi are usually arrested at the mouth of the ureter, or at its upper extremity. In this way nephrotomy often becomes curative, as it permits of the extraction of the offending calculi, either directly or by pushing from below upward or from above downward, or by retrograde catheterism of the ureter. Of six cases of calculous anuria treated by nephrotomy, two terminated fatally on account of a too tardy intervention. The four remaining cases were cured. The urine began to escape by the lumbar opening immediately after operation, and resumed the natural course in from one to thirty-five days, the calculus having fallen into the bladder. The large incision into the kidney for calculous anuria is justified by the pathological physiology.

THE EFFECT OF IODOFORM ON THE TISSUES.

L. V. STUBENRAUCH has recently completed an exhaustive experimental study on this subject (*Deutsche Zeitschrift für Chirurgie*, 1893, B. xxxvii., Hefte 5 u. 6). The investigation was suggested by the very frequent use of iodoform in local tuberculous affections and the good results so frequently observed. Many writers hold that the effects noted in these cases are due to the anti-bacillary action of the drug, by which the tubercle bacilli are destroyed. The effect of the iodoform on the tissues had not been studied, however, and Stubenrauch therefore determined upon the work of which this communication is the outcome.

The effect of iodoform upon the different tissues of the body, both normal and pathological, were carefully investigated. Observations upon man have been compared with similar experiments on animals.

The work is divided into four parts: 1. Historical; 2. Bacteriological; 3. Chemical; and 4. Histological.

The author arrives at the following conclusions:

1. Iodoform is not an antiseptic in the true sense of the term, as is corrosive sublimate, inasmuch as it does not destroy bacteria by short contact. The investigations heretofore made upon several different bacteria have shown that iodoform only inhibited the growth of milzbrand and tubercle bacilli.

Iodoform probably possesses no specific anti-tuberculous effect. Experiments on pure cultures of tubercle bacilli have repeatedly shown that when the iodoform remained in contact for a long time the growth was arrested, but it was not possible to destroy the vitality or growth of fully virulent tubercle bacilli by contact with iodoform in the animal body.

The favorable results which follow the iodoform treatment in cases of chronic tuberculous abscesses must not be taken as unconditional proof of the specific anti-tuberculous (anti-bacterial) effect of iodoform. The bacilli which are contained in tuberculous abscesses die under the influence of iodoform, but it is not proven that the destructive effect is primarily due

to the iodoform; there is a greater probability that the effect of the latter on the tissues, in connection with the experimentally proved slight anti-bacterial effect, has caused the destruction of the bacilli. Iodoform interferes with bacterial growth—if ever—in the undecomposed as well as in the decomposed condition.

2. The decomposition of iodoform can take place outside of the body as well as inside.

a. In solutions (ether, alcohol, or oil) or mixtures (water, gum, or glycerin) which are exposed to the sunlight. In the mixtures, decomposition of iodoform takes place in a warm place even if light be excluded, the rapidity depending upon the degree of the temperature. The effect of live steam on iodoform mixtures or emulsions is to separate certain quantities of iodine (and hydriodate) and form new compounds, or they remain free, according to the nature of the different organic substances which are present. The quantity of iodine which becomes liberated from iodoform at 98° or 100° is according to the nature of the several vehicles, and the greater or less excess of air, but is independent of the form of the preparation. Considerable decomposition takes place in iodoform by the heat of live steam in glycerin.

b. Iodoform is further decomposed outside of the body by the liberation of hydrogen, and further through reducing substances—as, for example, powdered zinc, silver—and also through neutral nitrate of soda (with the addition of heat), and finally through the products of the bacteria (ptomaines). Inside of the body there is decomposition of iodoform in considerable degree, especially in wounds in which there is active reduction (and where ptomaines are also present), in the cellular tissue under the skin, in the intestinal tract, the great cavities of the body, etc. With the albumin of the tissue juices the iodoform unites to form iodalbumin, which when liquid may be absorbed; if not, it decomposes further. The iodoform leaves the body in the form of soluble combination. The local as well as the general effect of the iodoform is a protracted iodine effect.

3. Iodoform acts on the tissues of the body, however, only if it is decomposed. Locally as well as from the blood it acts on glandular organs to such a degree that degenerative decay of the epithelial elements takes place. In this way the local application of iodoform to the kidney produces a degeneration (fatty) in the epithelium, and also a decay (fatty) of the cells in the kidney, liver, and other organs, if the iodoform has produced a general effect. All pathological new formations are influenced in a high degree by iodoform. Iodoform stops the formation of giant cells in the tissues in the neighborhood of a foreign body.

In serous cavities it causes coagulation of albumin, which, if the conditions of absorption are favorable, soon disappears. If the iodoform becomes decomposed and if certain products of decomposition remain for a long time in the cavity in consequence of unfavorable conditions of absorption, as in hydrocele, etc., then these (products of decomposition) are capable of causing an inflammation in the walls of the cavity. The effect of this is a transudation which coagulates, becomes organized, and cure results by the formation of connective tissue.

On tuberculous tissue iodoform acts probably by hastening the decay of the epithelioid cell collections which are destined to degeneration, while the more

resistant of the epithelial elements is prepared for a change into healthy tissue.

ECHINOCOCCUS IN THE SAC OF A HERNIA.

KOSLOWSKI reported in the *Chir. Annalen*, 1893, p. 609 (*Centralblatt für Chirurgie*, 1894, No. 10), the following case: A man, thirty-four years of age, a blacksmith, applied for advice on account of a tumor in the groin which appeared on the previous day. The man had previously complained of undefined pains in the abdomen. On examination, a tumor as large as a small hen's egg was seen below Poupart's ligament. It was smooth, hard, flat on percussion, and its origin could be traced back into the inguinal canal. The patient said the swelling had frequently appeared before. This he reduced himself by pouring a little alcohol in a saucer, lighting it, and lying down by the flame, so that the tumor became warm. On this occasion this procedure failed. Strangulated inguinal hernia was suspected, and taxis attempted under ether. This failing, operation was performed the following morning. On cutting down, a vascular layer of fat presented which much resembled omentum. To clear up the matter, the sac was dissected free, with some trouble, and incised. The incision into the wall of the sac revealed a cyst as large as a pigeon's egg, a smaller cyst adjoining. The cyst proved to be echinococcus. A small mass of omentum was found and reduced. The neck of the sac was ligated and removed. The patient left the hospital on the twenty-sixth day, well. The author supposes that the echinococcus formed in the omentum.

OTOLOGY.

UNDER THE CHARGE OF

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THREE CASES OF UNINTENTIONAL OPENING OF THE LATERAL SINUS.

DR. J. E. SHEPPARD, of Brooklyn, N. Y., in the *Archives of Otolaryngology*, vol. xxii. No. 3, gives an account of three cases of unintentional opening of the lateral sinus. In the first case there seems to have been entire absence of a bony wall between the mastoid and cranial cavities. By the perforation of a membranous diaphragm between these cavities a hemorrhage occurred. In the second case the flow of blood came after removing a pledget of cotton used for drying-out the cavity. It seems probable that with the curette a piece of necrotic bone was made to wound the sinus wall, but was not sufficiently displaced to allow of hemorrhage until the cotton was removed. There were no disturbing symptoms, and the wound healed entirely in a comparatively short time. In the third case, the author says, it is difficult to explain how the sinus was opened. He suggests, as an explanation, that the curette may have splintered the inner plate, the posterior end of the splinter penetrating the sinus wall.

TREPANATION OF THE SKULL AND MASTOID PROCESS IN CONSEQUENCE
OF SUPPURATIVE OTITIS.

POLO (*Révue de Laryngologie et d'Otologie*, vol. xiii., No. 1) records the case of a child, six years old, the subject of suppurative otitis media following measles. There was a rapid development of headache, coma, dilated pupils, vomiting, left internal strabismus, contraction of the muscular fibres of the face and of the orbicularis muscle. There was also a perforation of the membrana tympani. The mastoid process was painful, but its aspect was normal, and there was no paralysis of the limbs. Polo first performed trepanation of the mastoid process without any result. On the next day he trephined the skull in the temporo-sphenoidal region, puncturing the brain forward and upward without any success. Pus was finally discovered in the centre of the temporo-sphenoidal lobe at the depth of 4 cm., and the abscess was opened by a bistoury. The child died the following night in coma. After the operation the left eye, which had been turned inward, deviated outwardly.

EXTENSIVE NECROSIS OF THE TEMPORAL BONE OF A CHILD; MASTOID
OPERATION; DEATH FROM EXHAUSTION AND HEMORRHAGE.

DR. KNAPP, of New York, read a paper under the above-named title at the meeting of the American Otological Society (*Transactions*, vol. v.) The patient was a feeble, anæmic child. For a few months there had been an offensive and copious otorrhœa of the left side. The mastoid region was swollen and soft, but no fluctuation was present. The mastoid was exposed, but there was no subperiosteal collection of pus. The outer table of the mastoid was then removed, exposing a large cavity filled with necrosed bone and granulations bathed in pus. This was removed and the cavities packed with corrosive-sublimate gauze. The child improved to some extent, but there was no tendency to repair. The child sank and died in the course of a few weeks.

NOTES ON SIXTY CASES OF DISEASE OF THE MASTOID PROCESS IN
WHICH THE ANTRUM WAS OPENED.

DR. ADOLPH BRONNER, of the Bradford Infirmary, England, during the last year has operated upon a number of mastoid cases. Of the 60 cases referred to, 19 were under ten years of age, 20 under twenty years, 12 under thirty years, and 8 over thirty years of age; 39 were males, 21 were females; 25 were acute and of under one month's duration. In 17 cases there was an external fistula. In 21 there was a mastoid abscess. In 10 the mastoid process was thickened. In 8 there was no swelling, but pain on pressure, and in 4 there were no objective or subjective symptoms whatever in connection with the mastoid process.

In 45 cases there was either a fistula or some superficial caries of the bone found at the time of the operation, and in 15 cases chiselling to some depth was necessary before striking pus or the antrum. In 8 cases the operation failed to relieve the symptoms and the patient died in from one to fifteen days. The ear disease was due to influenza in no fewer than 5 of these cases.

Brain abscess was the cause of death in 2 of these cases, meningitis in 3, and disease of the lungs in 3, in 2 of which were found thrombus of the lateral sinus, and in 1 the sinus was normal.

Of the 52 cases which were relieved, 3 showed signs of disease of the lungs, in 2 of which the mischief was diagnosticated before the operation; 36 of the 52 were cured within one year, that is, the discharge from the ear had ceased, whereas 9 still had a discharge at the end of one year, and 7 were lost sight of. That the discharge still continues in a very large number of cases is, in the opinion of Dr. Bronner, due to the fact that the after-treatment is so frequently neglected.—*British Medical Journal*, vol. ii., 1893.

SYMPTOMS AND TREATMENT OF THE SEPTIC INFECTION OF THE LATERAL SINUS, AS ILLUSTRATED BY TEN CASES.

MR. W. ARBUTHNOT LANE, in the Section of Otology of the British Medical Association, presented a paper based on ten cases of septic infection of the lateral sinus on which he had operated. In every case the suppurative disease of the ear was the origin of the infection of the sinus. Fourteen very interesting conclusions follow, which want of space obliges us to omit.—*British Medical Journal*, vol. ii., 1893.

THE TREATMENT OF OTITIC BRAIN ABSCESS.

KRETSCHMANN (*Münchener medizinische Wochenschrift*, 40. Jahrgang, No. 29) gives an account of two cases of otitic brain abscess. The first was of special interest because of its occurrence in consequence of an acute suppuration of the middle ear. On account of the absence of characteristic symptoms the abscess was not discovered until the autopsy.

The other abscess of the brain developed in connection with a chronic suppuration of the middle ear and was cured by operation.

DISCUSSION ON THE SURGICAL TREATMENT OF MASTOID DISEASE AND ITS COMPLICATIONS.

THE above named discussion was conducted in the Section of Otology of the British Medical Association at its meeting in Newcastle-on-Tyne. The discussion was opened by PROF. MACEWEN, of Glasgow, who said that the title of the subject for discussion meant the extension of middle-ear disease to the mastoid region, and that it included for the most part infective disease of the middle ear, and excluded tubercle and carcinoma. He further said that he had found that the greater majority of these diseases travelled from the middle ear to the mastoid antrum and cells, after that invading the mucous membrane, the bone, the dura mater, and membranes of the brain. In many instances, after erosion of the bone, masses of granulation tissue extruded themselves upon the dura mater, which, on removal, promoted re-infection by a fresh surface coming in contact with the infective material pent up in the middle ear. In infective purulent disease of the middle ear the mastoid, antrum, and the mastoid cells ought to be thoroughly ablated. As a rule, after opening the antrum the attic of the middle ear was exposed by enlarging and opening the osseous parts in front. After exposing the

attic, the ossicles are to be removed, and the whole of the granulation tissue of the middle ear cleared out. After this the tegmen of the attic should be scrutinized by efficient light, and if eroded fully opened up, the granulation tissue removed from the dura mater and the brain laid bare, and if necessary opened into. He then spoke of further treatment of brain abscess and of disease of the sigmoid sinus and infective thrombus of this sinus.

MR. VICTOR HORSLEY said that his experience of such cases coincided with almost every point Prof. Macewen had advanced. He said the most important question among those that he would consider, at least as far as the interests of the patient were immediately concerned when the case was one of simple otitis media purulenta, was the question as to how long effort was to be made by ordinary antiseptic treatment to get the cavity to heal up before the surgical operation of clearing the tympanum and mastoid was undertaken. He suggested that one year would be the limit, and that if the discharge had not subsided, and if cicatrization did not occur within that period, the antrum of the mastoid should be laid open and the opening continued into the tympanum so as to make one space of both cavities. In this way, he suggested, the grave risks to life of persistent discharge from the ear, such as blood-poisoning, destruction of the bone, thrombus of the sinuses, inflammation of the membranes of the brain, and cerebral abscess could be avoided.

MR. HUGH E. JONES, of Liverpool, then considered a method of determining the condition of the mastoid before operating. He said that in the vast majority of cases the tuning-fork was heard best when placed over the small depression, called by Prof. Macewen the supra-meatal triangle, which existed just below the posterior zygomatic ridge and a little above and behind the bony osseous meatus. In a few cases the sound appeared to be nearly equal over the whole mastoid, but at the upper and posterior margins well defined. In one such case, in which the sound was unusually well conducted, on opening the mastoid it was found to consist of one large cavity which was filled by cholesteatomatous masses. The same auscultatory result was obtained in another case of cholesteatoma of the meatus and tympanum. In cases in which the sound was diffused, but not unusually loud, or perhaps less loud than usual, he had found a diploëtic or sclerosed mastoid with a small deep-seated antrum.

DR. WILLIAM HILL in his remarks said that in most of the specimens which he presented, the postero-supra-meatal triangle with its pit could be well seen, and when this portion of the bone was removed, as in some of the bones shown, the antrum was found at a variable depth beneath. He thought the term, mastoid antrum, a misnomer, because the antrum was bounded above and externally by the squamosal bone, anteriorly by the petrous bone and inferiorly only by the mastoid portion of the petro-mastoid bone. The term temporal antrum appeared to be free from objection.

DR. WILLIAM ROBERTSON gave as his opinion that chronic discharges from the ear favored infection, which might lead to invasion of important structures lying close at hand. He agreed with Prof. Horsley that one year should be the limit of antiseptic treatment for the cure of chronic otitis media purulenta.

MR. RUSHTON PARKER, of Liverpool, advocated the routine use of car-

bolized glycerin, one in twenty, as suggested to him by Mr. Lowe, of Bath, in preference to antiseptic injections which could not act thoroughly before the mastoid opening was made and tended to drive inward, without removing, septic agents and products confined in the bony cavity.

DR. WILLIAM MILLIGAN, of Manchester, advocated opening the tympanic attic, and its exploration in cases of chronic suppurative middle-ear disease at the same time that the antrum was opened. The attic offers such an admirable space for the production and propagation of septic material that it should be the surgeon's aim to clear it thoroughly of all its putrid contents.—*British Medical Journal*, vol. ii., 1893.

[So true is this that it is highly probable that many cases of antro-mastoid suppuration could be prevented by an early removal of diseased ossicles in chronic suppuration of the middle ear, especially of the attic.—REP.]

THE TREATMENT OF ENCEPHALIC ABSCESES CONSECUTIVE TO SUPPURATION OF THE EAR.

A. BROCA (*Gazette hebdomadaire de Médecine et de Chirurgie*, Année xl., No. 38) under this title gives a general review of this subject from the time of Lebert down to the present time. After considering at some length the opinions of Barker, Stoker, Bergmann, Hare, J. Lloyd, Macewen, MacBride and Miller, Chauvel, Gull and Sutton, Krishaber, Pitt, and others, he says: "Being given a chronic suppurative otitis media, accompanied with cerebral symptoms not well determinable if there is a mastoid fistula or symptoms of mastoiditis, it is necessary to perform generous trepanation of the mastoid and of the tympanic cavity. The same thing should be done even when the mastoid region appears normal externally, for sometimes an unsuspected retention of pus will be found in it which causes the symptoms, and also because, if it is necessary to go further, the mastoid path is the best way of proceeding."

OSTEOPLASTIC OPERATIONS ON THE SKULL, WITH REPORT OF A CASE OF CEREBRAL ABSCESS FOLLOWING OTITIS MEDIA CURED BY OPERATION.

DR. BRENTANO, in *Allgemeine medicinische Central-Zeitung*, No. 26, gives an account of a brain-abscess in a patient who had suffered from otorrhœa since childhood. Lately, following a cessation of the discharge, headache, constriction of the head, stiff neck, irregular pulse, somnolence, and tenderness of the occiput manifested themselves. The mastoid process was opened, and its cells found to be in a state of suppuration. After removal of the pus the dura was exposed and found to be black in color at the upper part of the cavity. As only temporary improvement occurred, another endeavor was made to find the suspected abscess beneath the discolored dura mater. At this point an abscess was discovered and emptied. Undisturbed recovery then took place.

TREPANATION FOR ABSCESS OF THE BRAIN.

TERRILLON communicates the history of a case of trepanation undertaken or relief of an intra-cranial abscess consecutive to chronic suppuration of the ear. The operation was performed eighteen months before it was reported,

and the cure appears to have been complete. The abscess formed in a strong and vigorous man who was attacked with pain in the right ear, fever, and finally, suppuration in the ear terminating in a discharge, in 1880. Six years later the patient consulted a specialist, who removed numerous polyps. Four years later he was attacked with pains in the temple, accompanied by vertigo and syncope from time to time. A year later the pains became more violent and the fever intense; finally these symptoms were followed by complete coma. When Terrillon first saw the case he diagnosticated an intra-cranial abscess near the petrous bone, probably between the dura mater and the bone. Trepanation was proposed and accepted, and the man, as already said, made a good recovery in the course of six months, and has remained well to the present time.—*Tribune Médicale*, 2d series, No. 3.

SUPPURATIVE OTITIS; CEREBRAL SYMPTOMS; TREPANATION; DEATH BY MENINGITIS; AUTOPSY.

DR. GELLÉ, in the *Tribune Médicale*, 2d series, No. 33, gives the history of a case of the nature above named occurring in a man forty years old. Pain was complained of in the left ear; no pain was felt in the mastoid process. Pain upon pressure was excited in the parotid region. There was violent headache, and there had been a chronic otorrhœa. Some relief was experienced by the opening of an abscess in the canal. The patient then left the hospital, returning, however, in eight days. The patient, after suffering intensely with headache and pains in the neck—without any pain, however, in the mastoid—with marked febrile symptoms, without high temperature, gradually sank into a coma in the course of three days. He was then trephined, but died two hours afterward without having recovered consciousness. The post-mortem examination revealed the existence of pachymeningitis throughout the extent of the sphenoidal fossa and in the occipital region, with sero-sanguinolent exudation around the petrous bone, and other results of intra-cranial inflammation.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

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ARTHRITIS DEFORMANS OF THE LARYNX.

DR. W. E. CASSELBERRY, of Chicago, read a paper on this subject at the last meeting of the American Laryngological Association (*New York Med. Journ.*, vol. lviii., No. 16). He selects this term in preference to rheumatoid arthritis, in deference to his opinion that the disease is unrelated either to rheumatism or to gout.

A widow, fifty-eight years of age, had been afflicted for ten to fifteen years or more with progressive general symmetric arthritis of upper and lower extremities, but most markedly in the joints of the fingers and in the wrists. On two occasions, at intervals of two or three years, this patient had suffered with attacks of progressively increasing laryngeal dyspnœa similar to the third and last attack in which she came under the consultant care of Dr. Casselberry. She had then been suffering for some weeks with laryngeal dyspnœa which became so severe as to occasion marked inspiratory stridor and a notable expiratory noise.

The arytenoid eminences were swollen, but not grossly distorted, and were restricted in their movements. The posterior or cartilaginous portions of the vocal bands were swollen downward, upward, and inward, a condition attributed by the author to probable proliferative changes in the cartilaginous tissues. The abduction of the vocal cords, even in forced inspiration, was so slight as to leave but the smallest possible space between them free for respiration.

For two weeks the condition remained practically unchanged, and the debility from the dyspnœa became so great that an appointment had been made to perform tracheotomy, when respiration became somewhat easier and continued to improve until, at the end of six weeks, the patient breathed noiselessly and without conscious effort during quietude. Abduction was somewhat better, but the vocal bands could not be estimated to move more than one sixth of the proper distance, and there was no change in the aspect of the arytenoid eminences and the posterior extremities of the vocal bands. Treatment had been directly chiefly to relieve the dyspnœa and to reduce the congestion of the larynx, with alkaline and emollient sprays to free the parts from mucus and allay the inflammatory condition.

ABSCESS OF THE LARYNX.

M. GOUQUENHEIM has related (*Annales des Mal. de l'Oreille, etc.*, xix., 10) a case of tuberculous peri-laryngeal abscess proceeding from disease of the bodies of the lowest three cervical vertebræ, the sixth especially. Dyspnœa, progressive suffocation, cyanosis, and stridor rendered prompt tracheotomy necessary; but, although the trachea had not been incised, the operation gave issue to a large amount of pus with great amelioration for several days. The patient died after intense cervical, clavicular, thoracic, and brachial pains had existed for some fifteen days, with progressive paraplegia, retention of urine, and loss of reflexes.

MR. MOLL has reported (*Ibid.*) an intra-laryngeal abscess in a robust man, which appears to have been the first lesion in an attack of influenza with pleuro-pneumonia. The abscess underwent rupture in the vicinity of the vocal apophysis of the right vocal band, with subsidence of existing œdema of the right arytenoid cartilage, and restoration of mobility in the previously immobile vocal band.

PERSISTENT NEURALGIA OF THE WING OF THE NOSE.

M. GORIS reports (*Annales des Mal. de l'Oreille, etc.*, t. xix., No. 10) a case of four years' duration developed at the close of a puerperal eclampsia. There

were facial paresis and difficulty in speech. Medicinal and electric treatment had failed. M. Goris elongated and resected the suborbital nerve in the cheek, with cessation of the pain, successfully maintained for the seven months that had since ensued.

LARYNGITIS HIEMALIS.

DR. J. C. MULHALL, of St. Louis, at the last meeting of the American Laryngological Association (*New York Med. Journ.*, vol. lviii., No. 16), reported a form of laryngitis occasionally observed by him during the preceding twelve winters; never during the intervening summers. He regards it as a winter variety of subacute catarrhal laryngitis in which the secretions are adhesive crusts from the beginning, producing dysphonia and even aphonia mechanically. Some of these patients would get laryngitis in summer, but there would be no crusts and no aphonia. Two of them rapidly lost all trace of the affection when transferred to the warm, moist air of Florida, and one of these had a recurrence on returning to St. Louis before cessation of the cold weather. It is not the ordinary laryngitis sicca and is not associated with similar disease of the pharynx or the nose, or necessarily with any other malady. Hygienic treatment, prophylactic and remedial, will often cure mild cases. Severe ones demand cleansing and then soothing sprays, repeated as required during the continuance of the cold season, while the internal administration of pilocarpine and ammonium chloride have been found serviceable.

NASAL AND RHINO-PHARYNGEAL TUMORS.

At the Annual Reunion of the Society of Belgian Otologists and Laryngologists, June 4 (*Annales des Mal. de l'Oreille, etc.*, xix., 10), several interesting cases of fibroma and sarcoma were reported by GEVAERT, WAGNIER, BOVAL, and NATIER.

RHINITIS ŒDEMATOSA.

DR. J. C. MULHALL, of St. Louis, described to the American Laryngological Association (*New York Med. Journ.*, vol. lviii., No. 16) some cases of œdema of the mucous membrane of the turbinate bodies, in form somewhat resembling myxoma, and which he attributes to disease of the alimentary tract, chiefly of biliary origin, irritating the sympathetic nervous system. Intelligent dietetics, hydrotherapy, well-ordained physical exercise, massage, nerve rest, and the avoidance of drugs, form the basis of treatment. All topical treatment, except perhaps scarification, which affords temporary relief, should be avoided.

AMYGDALITH.

At the last Congress of Otologists and Laryngologists of Belgium, M. LECOCQ presented (*Annales des Mal. de l'Oreille, etc.*, xix., 10) a calculus which he had extracted from a tonsil. It measured 26 millimetres in length and 13 in width, and weighed $2\frac{1}{2}$ grammes.

STRICTURE OF LARYNX SEVERAL YEARS AFTER REMOVAL OF A NEOPLASM.

M. GEVAERT (*Annales des Mal. de l'Oreille, etc.*, xix., 10) seven years ago removed with forceps a fibrous polyp from the larynx of a young girl. A year ago she presented herself with complete aphonia and pronounced stridor; both of about a year's duration. The vocal bands were found adherent by a sort of diaphragm which extended from the anterior angle to the posterior third of the glottic space, of which but a small oval aperture remained patent posteriorly. The membrane was incised with the concealed knife of Morell Mackenzie, and dilatation was maintained for eight days with the tracheal canulas of Stoerck. A slight readherence had been produced anteriorly.

INTUBATION OF THE LARYNX..

DR. CHARLES WHITNEY read a paper before the Surgical Section of Suffolk District Medical Society (*Boston Medical and Surgical Journal*, vol. cxxix., No. 14) based upon seventy-eight cases in his private practice. We note the following practical points: He has found some of the appliances furnished him defective, including gag, obturator, and even the tube; and he calls especial attention to the carelessness with which they are often made. He has devised an obturator with an acuter angle than a right angle, and which he finds will render the introduction more easy than with the O'Dwyer angle. He assures himself that his tube is in position by inserting his finger into the œsophagus, and recognizing its anterior wall as a septum between the finger and the tube of the larynx. He also finds O'Dwyer's extractor defective, and recommends a better one, devised by Dr. Nichols, of the City Hospital, as so excellent as to avoid all trouble in extraction.

In the same journal (No. 16), DR. GEORGE W. GAY, Visiting Surgeon of the Boston City Hospital, contributes a paper upon "Tracheotomy and Intubation" at the Boston City Hospital. There had been 456 tracheotomies with 110 recoveries, 24 per cent.; and 442 intubations without tracheotomy, with 90 recoveries, 20 per cent. In estimating their comparative merits both procedures should be studied, he justly contends, with reference to the amount of relief they give to the laryngeal dyspnœa; and on this ground he contends that with rare exceptions intubation affords as much relief as tracheotomy, while it can be practised in many cases in which the latter would be refused. Furthermore, he finds that section of the trachea after failure to relieve dyspnœa by intubation does not promise much benefit except in those cases in which membrane has been so pushed down by the tube that the patient is unable to expel it. At the same time the previous failure by intubation does not seem to lessen the chances of subsequent relief by tracheotomy, except in the gravest instances, when any disturbance may result in collapse.

In conclusion, he believes that intubation is preferable in the majority of cases in children under seven years of age.

[The views of Dr. Gay and of his colleague are doubly valuable from the fact that they have performed nearly as many intubations as tracheotomies, and both in great numbers; and that of late years intubations have been performed by them in by far the greater proportion.]

RECURRENT TONSILLITIS.

DR. C. A. LELAND strongly urges (*Boston Medical and Surgical Journal*, vol. cxxix., Nos. 15 and 16) division of the bridges between the walls of the diseased crypts, for which purpose he has devised a probed-pointed delicate knife-blade at an angle with its shaft. A number of interesting cases in point are detailed.

OBSTETRICS.

UNDER THE CHARGE OF

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FATAL NAUSEA AND VOMITING OF PREGNANCY.

DAVIS (*Medical News*, June 2, 1894) at a meeting of the American Gynecological Society, May 29, 1894, presented a paper on the above subject, with a report of three cases, all with fatal termination.

Each of the patients presented as significant symptoms, a fatal condition of anæmia with profound alteration in the blood, as shown by purpuric spots more or less extensive; severe vomiting, accompanied by straining, and in the later stages coffee-ground vomit; substernal pain; a temperature fluctuating a little above or below the norm, and a pulse of considerable rapidity.

A post-mortem on the second case revealed a most interesting condition: A longitudinal section of the uterus was made through the anterior wall. The organ was found to be dark purplish-red in color, its sinuses filled with soft currant-jelly like masses, not clotted. On the posterior wall, on a line extending between the orifices of the Fallopian tubes, was a transverse line resembling scar tissue. The internal os had been dilated, but was excessively resistant, the tissue resembling gristle. On the anterior and posterior walls of the cervix were areas of fibrous tissue, excessively firm, resembling that extending across the posterior surface. The stomach showed areas of thrombosis along its greater curvature. The heart was excessively friable and dark-red in color; valvular openings admitted two fingers; no evidence of atheroma could be found.

The blood was fluid, dark, currant-jelly like in color, and without clots. No ante-mortem clot was found in the sinuses of the uterus.

A close examination of the uterus revealed an exceedingly interesting condition of the cervix; it consisted of dense connective tissue arranged in

whorls and containing two cysts, one an inch and a quarter in diameter, filled with yellowish fluid containing free small, ovoid, non-nucleated cells. A very interesting phenomenon shown in microscopical sections of the kidney was the presence of hyaline casts *in situ*.

No autopsies was made on the other two cases.

The author concludes that the danger of nausea and vomiting lies in the production of pernicious anæmia. When this is once established the uterus should be emptied. Replacing and retention by tampons suffice only for mild cases.

MIGRATION OF OVUM FROM THE OVARY TO THE TUBE.

LODI (*Archiv für Gynäkologie*, 1893, B. 45, H. 2) after many experiments on rabbits, concerning the migration of the ovum from the ovary to the tube, summarizes his results as follows:

1. The infundibular and tubal cilia of the rabbit may be able to obstruct the passage of a body no larger than its ovum, provided the animal is at puberty.

2. The infundibulum is able, not merely to conduct an ovum from the ovary, but also from the free abdominal cavity into the inner genital tract. The old idea that the pavilion must apply itself to the ovary for the purpose of guiding the ovum is no longer held; a new experimental proof is afforded of the so-called external migration.

3. The migration of the ovum seems independent of the rut (in animals) and of coitus.

4. The first part of the journey through the tube is far more rapid than that near the uterus.

5. The tubal peristalsis seems to play but a small part in the migration, the small size of the ovum affords too small a point of effort, and also the direction of the peristaltic action varies. For picking the ovum out of the abdominal cavity, perhaps the firm lateral openings of the tube may avail by their ciliated margins.

NEW TREATMENT OF ASPHYXIA NEONATORUM.

PROCHOWNICK (*Centralblatt für Gynäkologie*, 1894, No. 10) describes a new mode of treatment of asphyxia neonatorum which he proposes as a substitute for Schultze's method. It consists in suspending the child by the feet, the head being lightly supported. If no assistant be available to hold the child's feet, the operator grasps the ankles between the fingers of his left hand. With the right he grasps the chest, the thumbs being in front, and makes six to eight regular compressions; at first expiration. The nose and mouth are freed from any mucus, which allows air to enter with the inspiratory effort. It may be necessary to douche the suspended child with warm water to assist the respiratory efforts.

THE INDUCTION OF LABOR IN THE ALBUMINURIA OF PREGNANCY.

PUECH (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1894, No. 3) contributes an article relative to the propriety of inducing labor in cases of gravid albuminuria. He considers the albuminuria to be regarded not

merely from the standpoint of its connection with eclampsia, but also to its bearing, especially if persistent, on the induction of permanent Bright's disease. Moreover, its influence on the fœtus is to be considered; as numerous observations seem to show that in cases of maternal albuminuria, the fœtus when born is frail or badly developed. Many die in utero and many abortions and premature labors are due to this cause. Post-mortem examinations reveal lesions of the placenta; hemorrhagic foci; atrophy of the villi or bloody effusions between the uterus and placenta. In the milk-diet we possess a means that surely places us beyond the reach of the great accidents of eclampsia, but this is not the sole consequence of albuminuria; the renal future of the mother must be considered, as also must the child threatened by placental hemorrhage. The various agents that act so well in non-puerperal albuminuria are ineffectual here until the pregnancy be interrupted, it being the cause of the condition. This not merely saves the mother, but in many cases the child as well. In a pregnant woman, if the albuminuria be persistent, accompanied by gastro-intestinal uræmia and dyspnœa, and if under a rigid milk-diet the albumin persists during eight or nine days, the maternal interests demand the induction of labor.

SYMPHYSIOTOMY.

MÜLLER (*Berliner klinische Wochenschrift*, 1893, No. 48) discusses the question of symphysiotomy, especially the partial section of the joint, as a partial substitute for the Cæsarean operation. He regards the new operation in a very favorable manner, and cites a case of a rhachitic V-para in whom labor was induced at thirty-two weeks for pelvic deformity. After rupture of the membranes it was found that the presentation had changed to a brow, the presenting part being firmly wedged in the inlet. After consultation, symphysiotomy was decided upon in preference to craniotomy and the Cæsarean operation, both of the latter having been considered. The operation was done by the external method, the symphysis being incompletely cut through. The child under strong pains was delivered spontaneously, but was so deeply asphyxiated that it was impossible to resuscitate it. The cord was twice encircling the neck. A portion of the abdominal wound was closed by silver-wire sutures, the remainder being filled with a tampon and left to granulate. No bone sutures were used. Three weeks later the patient was able to go about the room, but later was operated on for a vesico-vaginal fistula, which probably developed from pressure of the fœtal head during the considerable time preceding the operation in which the patient was in labor.

PUERPERAL INFLAMMATION.

DOLÉRIS (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1894, No. 3) contributes an article relative to puerperal inflammation. He concludes:

1. That puerperal inflammation is derived from a streptococcus identical with the streptococcus pyogenes.
2. That suppurative inflammations exist, of less intensity, in which the staphylococcus plays the principal part.
3. In the pus of certain cases of peritonitis and of puerperal lymphangitis

following gangrenes of the uterine mucous membrane, vibriones and bacilli of putrefaction may be found. The habitat of the streptococcus is the surface about the point of the placental attachment, the clots that may have formed in the orifices of the sinuses, and any discharges that may be in the uterine cavity; also in pus, though if this be in a closed cavity the streptococcus soon degenerates or dies. The pathogenic action of the streptococcus may be—

1. Hypertoxic, by its toxins, and limited to the first stage of the inflammation.

2. Destruction of vitality, and a cause of necrobiosis *en masse* of the tissues.

3. Pyogenic or septic at the same time. The vitality of the streptococcus is uncertain; the author believes it may lie dormant in the tissues for years.

There are three leading types of this inflammation:

1. Inflammation and local suppuration.

2. Inflammation and migratory suppuration.

3. Hypertoxic infections—non-suppurative.

The first group represents nearly always the mildest complications of recent puerperal traumatism, be they slight or grave.

In the second group, by far the most common, is the mixed migration of the streptococcus. It follows the mucous passages by means of the lymphatics to the pavilion of the tube and the peritoneum, also along the network of intra muscular interspaces, perforating thus the uterine walls, from mucous membrane to the peritoneum, the parametrium, the ovary, or the tube.

THE CAUSATION OF SPONDYLOLISTHESIS.

NEUGEBAUER (*Zeitschrift für Geburtshilfe und Gynäkologie*, Band xxvii., Heft 2) contributes an article upon the causes producing forward displacements of the vertebra (spondylolisthesis), and the differential diagnosis of the same. The author narrates several cases, and gives numerous well-executed illustrations of instances where the condition was the result of accident or injury in girlhood or adult life; the result of the injury being the throwing forward of the fourth or fifth lumbar vertebra, with the formation of a sharp forward bend at the point of the sacro-lumbar union. The patients presented a marked folding of the abdominal walls, giving the body a telescoped appearance. In other cases, the body at the lumbo-sacral articulation made an abrupt forward bend, the abdomen being enormously pendulous, especially in pregnancy. In many other cases narrated, marked rhachitis existed and was the cause of the spinal bend.

The author also alludes to the published cases and opinions of Lane, relative to women who have performed hard labor in carrying weights, where in some cases the lower lumbar vertebræ were forced forward. In these cases there may be destruction of the bodies and intra-vertebral substance from the tenth dorsal to the second lumbar, especially in front. The bodies of the third, fourth, and fifth lumbar vertebræ, with their fibro-cartilages, as they form part of the convexity of an antero-posterior curve, will be but little diminished in front. The force tends to displace the lumbar vertebræ forward and downward, the fifth lumbar being pushed forward, projecting beyond the sacrum. Neugebauer regards this as something quite peculiar and local, while Lane considers it as a part of a general change in the spinal column, very often due to the vocation.

GYNECOLOGY.

UNDER THE CHARGE OF

HENRY C. COE, M.D., M.R.C.S.,
OF NEW YORK.

PERFORATION OF THE UTERUS DURING CURETTAGE.

ALBERTI reported at a recent meeting of the Berlin Obstetrical Society (*Centralbl. für Gyn.*, 1894, No. 21) the case of a patient, aged thirty-two years, who had borne four children. Her menstruation had long been profuse, when, after skipping a period, she began to have increased flow and a foul discharge. She was very anæmic and had elevation of temperature. Her physician performed curettage, using a sharp instrument; he then introduced polypus forceps in order to remove supposed decidual membrane and drew out a loop of intestine. He pushed the intestine back into the vagina, tamponed with gauze, and sent the patient to the hospital, where Alberti performed cœliotomy three hours after the accident. A perforation an inch long was found on the right side of the fundus uteri, through which a loop of gut was prolapsed. It was so firmly grasped at the os internum that it was necessary to use a hernia-knife in order to free it. The prolapsed portion (seven inches in length) was much congested and was black in color at the point of constriction. The uterine wall was unusually thin at the site of the perforation, which was closed with four Lembert sutures. The patient had a normal convalescence, but four weeks after the operation the hemorrhage recurred, so that it was necessary to repeat the curettage, a quantity of ordinary fungosities being removed. Six weeks later the same operation was repeated because of renewed bleeding. Two years had since elapsed and the patient had remained perfectly well.

In the discussion which followed VEIT reported a similar case in which he recognized the seat of the perforation on the posterior uterine wall by examination per rectum, opened Douglas's pouch, and succeeded in replacing the gut after enlarging the tear. As there was considerable hemorrhage and the uterus was probably septic, he performed vaginal hysterectomy, but the patient died of peritonitis. He regarded the forceps as a dangerous instrument in cases of abortion. A soft uterus could be perforated even with a sound; it made little difference whether a curette was sharp or dull, since the perforation was doubtless made with the rounded end rather than with the edge, but when the forceps was used there was the additional danger that a loop of intestine might be drawn through the opening. He was opposed to the removal of retained products of conception with forceps, unless they were first located with the forefinger and the forceps introduced along it as a guide.

GUSSEROW cited a case which he had seen in consultation in which the omentum had been pulled down with forceps. He opened the abdomen, which contained a considerable quantity of blood, ligated and excised the

prolapsed portion of omentum, and amputated the uterus, which was presumably septic. The patient had practically recovered from the operation, when she died suddenly from pulmonary embolism on the twenty-fifth day.

ORTHMANN stated that he had been called to see a patient by her physician, who had perforated the uterus with forceps and badly lacerated a loop of intestine, tearing away its mesentery. On performing celiotomy he found the intestine was adherent to the fundus uteri at the seat of the perforation. The uterus and adnexa were amputated and the injured portion of gut was resected, the patient making a good recovery.

OLSHAUSEN had observed a similar case, in which he was obliged to resect the intestine, but the patient was already septic and succumbed soon after. He was opposed to the use of both the sharp curette and the forceps in these cases; in fact, he employed instruments just as little as possible, preferring to remove foreign material with his finger.

MARTIN took a somewhat different position from the other speakers. He had seen a case in which an experienced gynecologist had perforated the uterus with forceps and drawn down thirty inches of intestine. Nothing could be done, as the patient was already moribund. In three cases of curettage out of several thousand in his own practice he had three times perforated the uterus with forceps, and once grasped a loop of intestine, but immediately recognized the fact and released the gut, when it slipped back into the abdominal cavity. Other surgeons had had a similar experience. All the patients had recovered without any reaction. Personally, he was unwilling to reject the forceps in cases of abortion, since he had used it satisfactorily for twenty years and could not dispense with it. When the cervix was sufficiently dilated to admit the finger, they were, of course, unnecessary. In cases in which it was necessary to first dilate the os, he used the forceps to remove fragments which had been detached with the curette or could not be removed with the fingers.

OLSHAUSEN strongly disapproved of Martin's recommendation of the forceps in incomplete abortions before the fourth month. In very early cases particularly, it was a dangerous instrument, and only the finger or curette should be employed. While an unskilful operator might do serious damage, even with his finger, he was much more likely to do so with the forceps.

VEIT agreed with the last speaker, and criticised Martin's statement that one could recognize when he had seized intestine and could release it from the grasp of the forceps without injury. Such skill would be possessed by few, and it was certainly wise to warn the general profession that this instrument should never be inserted into the uterine cavity except under the guidance of the finger.

[We have ventured to introduce this discussion *in extenso* because it deals with a subject of vital importance. The curette-forceps, devised by Dr. Emmet, is an exceedingly useful instrument for removing retained products of conception, but we are personally cognizant of two cases in which it was thrust through the uterine wall and a loop of intestine was drawn from the vulva. Celiotomy was performed in both instances, one case (reported by Dr. G. W. Bratenahl) being successful. Doubtless other unreported cases have occurred in this country, as the instrument is a favorite one with some operators. The advice to use forceps only as an adjunct to the finger and curette deserves general acceptance.—H. C. C.]

CARCINOMA UTERI.

MÜLLER (*Ibid.*) summarizes the results of his observations in 577 cases treated in Gusserow's clinic. In over a third of the number the patients were under the age of forty. There were none under twenty, the average being between thirty-five and forty. Vaginal extirpation was performed in 15.4 per cent., of which 52.92 per cent. of the patients were under forty. Forty per cent. of the whole number observed had passed the menopause, 60.1 per cent. of the latter being over fifty; 5.3 per cent. of the patients were nulliparæ. Contrary to the accepted belief, there was no direct relation between the number of children and the frequency of the disease, though the average number of abortions was high—0.57 per cent. apiece. In 8.14 per cent. the disease developed during pregnancy or the puerperium.

In some cases, especially inoperable, the initial symptoms were entirely absent, early pain being the exception. Bleeding during coitus was especially frequent. Menorrhagia and metrorrhagia were usually the first symptoms observed, foul discharges being later evidences. Vesical and rectal irritation were not infrequently noted. The duration of the disease appeared to be longer in old than in young subjects.

FIXATION OF A WANDERING SPLEEN.

RICHELOT (*Gaz. des Hôpitaux; Centralblatt für Gyn.*, 1894, No. 21) examined a patient with a painful tumor in the right iliac fossa, which was thought to be of appendiceal origin, or possibly tuberculous. On opening the abdomen it was found to be a displaced liver, adherent to the abdominal wall. The adhesions were separated, the organ was replaced, and was fixed in position with catgut sutures passed through the capsule and the parietal peritoneum. Three months after the operation the liver was found to be in its normal position, and the patient was entirely relieved of his former symptoms—pain and emaciation.

CORRIGENDUM.—On page 81 of THE JOURNAL for July, 1894, in the review of Forselles' *Thrombosis of the Lateral Sinus*, the original German title was by accident omitted. Below will be found the German title:

“Die durch eitrige Mittelohrentzündung verursachte Lateral-Sinus Thrombose, und deren operative Behandlung. Von ARTHUR AF FORSELLES, Assistenzarzt der chirurgischen Klinik zu Helsingfors.”

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THE DISTRIBUTION OF LEPROSY IN NORTH AMERICA.¹

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IN an attempt to discuss within the limits here set the questions connected with the distribution of leprosy in the northern part of this hemisphere, it is expedient at the outset to simplify the terms involved. By the designation, *lepra*, it is here intended to refer exclusively to that complexus of symptoms to which the title has, up to within a relatively recent date, been restricted in the annals of medicine. Aggressive attempts have lately been made to identify as among the manifestations of leprosy, syringomyelia, Morvan's disease, scleroderma, morphea, Raynaud's disease, *ainhum*, and some other affections. These, it is averred, are symptoms of an attenuated form of the malady occurring in the races best fitted by inheritance and development to resist the graver incursions of the plague. These views, not being as yet established by sufficient evidence, may be for the present purpose dismissed from consideration.

But some at least of the time-honored distinctions established by authors in this field may be now with safety set aside. The tubercular, anæsthetic, macular, mutilating, and mixed forms of *lepra* should figure no longer in the statistics of the disease. They are not varieties, but different external expressions of one and the same malady, often simultaneously shown in a single patient.

The bacilli of *lepra* have travelled from their home in Asia to the

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American continent, eastward and westward, in two distinct armies of invasion.

That advancing to the West divided into two companies, unequal in size, on the Syrian shores of the Mediterranean. Of these, the smaller division passed northward to attack Norway, Iceland, and Greenland; the vaster number straggled in an irregular line to the southward over Egypt, and southern and western Africa.

The northern germ colony, somewhat attenuated by reason, perhaps, of the vast wastes of cold seas traversed, ranged toward the northern boundaries of this hemisphere, along the shores of the St. Lawrence River. The southern colony, finding a more congenial soil and climate in Brazil and Guiana, multiplied and strengthened till their outposts had spread as far to the north as the West Indies and Mexico.

A single line of invasion was observed from Asia to the western coastline of this country. It extended directly from China, through the Samoan and Hawaiian Islands, to the seaboard of North America.

The prevalence of leprosy on the Sandwich Islands, in consequence of their commercial proximity to this country, has attracted the attention of medical men and others since the year 1830, when it is believed the first authentic case was recognized. At the settlement in Molokai, there are at the present date 1142 lepers. As to the number at large, the health officers of Honolulu believe that it is not great, as a consequence of a recent and carefully executed examination of the people in the several islands of this group.

Finally, through the Port of the city of New York, with its innumerable maritime connections, a door has been open to the immigration of the germ-carriers of this disease from every country of the globe.

In studying the distribution of leprosy in North America, after its introduction by the several routes thus recognized, several interesting facts are readily established. First, that with respect to the spread of the disease, the northern has suffered far less than the southern portion of the American hemisphere; second, that the prevalence of the disease, even in this latter portion, is far greater in the southern than in the northern provinces; third, that, as compared with other continents afflicted with the disease, North America suffers to-day less than either Asia or Africa; and, lastly, that if Mexico and the other countries south of the border line of the United States be not considered in the comparison, the relative prevalence of the disease in British America and the United States scarcely differs from that of all Europe, if Norway be excluded.

With respect to the distribution of leprosy in British America, I have arranged with my colleague, Dr. J. E. Graham, of Toronto, Canada, to report fully upon this part of the field. It appears from the records that about two hundred and fifty lepers have been cared for in the province

of New Brunswick since the year 1815. Dr. Graham will show that that there are probably not more than thirty lepers living to-day in that whole region.

The Consul-General of the United States in Havana, under date of the 20th of March, of the present year, sends me a communication from Dr. Daniel M. Burgess, Sanitary Inspector of the Marine Hospital Service, reporting that more than eighty male and female lepers are inmates of the Leprosy Hospital of Havana; and that the prominent physicians of that city estimate that there are more than that number living at large in the town. Infected individuals are known to be living also in Puerto Principe, Santiago de Cuba, and in every town of considerable size on the island. A low estimate, therefore, would allot between 300 and 500 lepers to Cuba alone. As to the segregation of the victims of the disease, if there be any laws providing for the same, they are in that country a dead letter.

In the Lepers' Home of the island of Jamaica, there were, at the date of the last report, eighty-six subjects of the same disease, the total number historically registered being between 700 and 800. Reports from the island of Trinidad enumerate 212 lepers at date of last report (*loc. cit.*), the estimated number for the entire island being 481. In Barbadoes there are between sixty and seventy; in Antigua, twenty-one; in Guadeloupe the disease is reported to be "endemic." The exact number of cases in St. Kitts, Nevis, and St. Vincent, where it is known to prevail, is undetermined. As a rule, there is no isolation of lepers in the British West Indies.

Turning to the main coast, the average number of lepers in the Lazaretto of the City of Mexico is thirty. The disease, which is here known as the "Mal de San Lazaro," has existed in the country since the conquest by Cortez; and outside of the capital of the republic and especially in the western regions it prevails, but to an extent not known. The Mexican authorities, however, believe that leprosy is at the present time not extending.

Numbers of lepers are seen in Panama by travelers in that country; but here, as in some other of the States of the southern portion of North America, statistical figures are not accessible. The disease is sparsely scattered in the mountain regions of Costa Rica, and also in Nicaragua, Honduras, and Salvador. The same is true of Guatemala, but in that country attempts have been lately made to insure strict segregation of the infected.

The United States of America has thus been exposed to incursions of leprosy from each of the four principal points of the meridian—from the north, from the south, from the east, and from the west. That the total result up to this date has been relatively insignificant has been due, not to a wisely directed vigilance, nor to barriers erected by science. It has

been owing rather to the accident of the general excellence of the habits, of the resources, and of the environment of our people.

At this date the distribution of lepers in the United States cannot be determined with accuracy, either for the present or for the past. Some of the reasons for this unfortunate fact are these :

1. The United States Government has neglected its obvious duty in this matter. It is admitted by the authorities that the figures representing the number of lepers in the country, collated at the date of the last census, have not yet been compiled ; that it is doubtful whether they ever will be compiled ; and that even if so compiled, the result would be so incomplete and unsatisfactory as to possess but little value.

2. The authorities in but a few States have taken the needful steps in the proper direction.

The State Boards of Health of Maine, Pennsylvania, and California, require the reporting to them of all cases of the disease. Segregation or isolation of lepers is required by law in Pennsylvania, New York, and Wisconsin only. In Pennsylvania and California the county authorities provide for the maintenance and medical care of lepers. In Minnesota the infected are registered and kept under observation, but not segregated. These local and insufficient attempts to regulate a disease threatening the population of forty-nine States and Territories of the Union, illustrate well the uncertainty that exists respecting its geographical distribution within our borders.

3. In the absence of a trustworthy official collation of facts, it is well known that the families of lepers here, as in other countries, as a consequence of fear or shame, or for other reasons, often wilfully conceal, so far as they are able to do so, the existence of leprosy in one or more of their number.

4. Many of the general practitioners of the United States are so unfamiliar with leprosy that they are unable to recognize it when confronted with it. This is not set down as a reproach, but as a fact based upon their own admissions, and an experience in recognized cases. This unfamiliarity with the disease, due to the infrequency of its occurrence in practice, has an unfortunate issue in two directions as respects the clouding of the question under consideration. It involves, first, the occasional non-recognition of the infected leper ; it also, at times, results in affixing the stigma of that disease upon patients with formidable evidences of a malady due to some simpler cause.

5. Among the cases of leprosy reported by wholly competent men as existing in different parts of the country it is often difficult to determine whether one or more patients do not also appear in other reports, the figures being thus duplicated to confusion. For many reasons it is often unwise and cruel to identify lepers by their individual names in reports of this kind.

6. The chances of embodying a single case in two or more separate reports of competent physicians is greatly enhanced by the movement of some leprosy patients from one part of the country to another. In the Orient, the leper is usually a pauper—a deformed and repulsive object of charity by the roadside. The United States, however, enjoys the unenviable distinction of being the one country where some of its lepers have the ability and opportunity to travel from one point to another—at times in a Pullman car, and often with a liberally provided purse. The following travels of lepers in and across the Union are cited merely as illustrations of this fact; all are substantiated by well-known details: Six trips from New York to San Francisco; seven from San Francisco to New York; one from San Francisco to Chicago; three from Chicago to New York; one from Nebraska to Illinois; one from Florida to Illinois; one from Chicago to St. Louis; one from New York to Florida. One of the Chicago lepers decided to visit for awhile his home in Sweden. He left the American city, crossed the ocean, passed through Stockholm on his way to his native village, retraced his route, and finally returned to Chicago, where he died one year later of his disease.

The credit of first collecting statistics as to the number and location of lepers in the entire country is due to the American Dermatological Association. Long before the subject had become the favorite theme of the sensation-monger upon the lecture platform, in the magazines, in the daily press, and even in the pulpit, this Association, under the painstaking leadership of its first President and first chairman of its Statistical Committee, Dr. James C. White, of Boston, began its investigation of this field. In the year 1878, a twelvemonth after the date of its organization, it published its first *Report of the Statistics of Cutaneous Diseases in America*, and in this report were included three new cases of leprosy, with detailed returns of the number of cases of lepra in Maryland, South Carolina, Georgia, California, Minnesota, New Brunswick, and in the Hawaiian (Sandwich) Islands. Since then the Association has collated a total of 204,860 cases of skin disease, including 56 cases of lepra, the percentage being 0.022. These figures do not, of course, represent the number of lepers in the United States, but only the number under observation of the experts represented in the membership of this body, or those reported directly to them.

Beginning, then, with these figures as a basis, there can be added to them the observations made by intelligent members of the profession connected with State Boards and Health Departments, as well as those of trained physicians, competent by education and experience to establish a correct diagnosis of leprosy. Most of their names appear in the bibliography appended to this report, which includes a list of more than one hundred and twenty papers, for the most part touching on leprosy in America, and contributed by American authors. It is scarcely need-

ful to add that in the compilation of reported cases it is proper to give large credit to the work done by such well-known American writers on the subject as Dr. H. S. Orme, of San Francisco; Dr. C. Grönvold, of Minnesota; Dr. N. W. Blanc, of New Orleans; Dr. Benjamin Lee, of Philadelphia; Drs. Allen, Morrow, and Piffard, of the city of New York; and Dr. W. H. Geddings, of South Carolina.

It may thus be approximately determined that the cases of leprosy heretofore recognized in the United States have been distributed as follows: In Arkansas, 3; in California, 158; in Dakota, 2; in Florida, 6; in Georgia, 1; in Idaho, 2; in Illinois, 13; in Indiana, 2; in Iowa, 20; in Louisiana, 83; in Maryland, 4; in Massachusetts, 5; in Minnesota, 120; in Missouri, 2; in Mississippi, 2; in New York, 100; in New Jersey, 1; in Oregon Territory, 3; in Pennsylvania, 6; in Utah, 3; in Wisconsin, 20—a total of 560.

Thus much by way of an approximate estimate of the number of lepers which have been at one time or another upon the soil of the United States. In attempting to indicate upon a map the proportion and distribution of these cases, by placing dark spaces within the outlines of those States respectively where they have been observed—the size of the spaces in each being proportioned to the number of cases—it becomes evident at a glance that the geographical proximity to a colony of lepers, of any point in this country where the population is relatively small, is of less importance as respects an accumulation of cases than is commercial activity between widely distant populous centres whose intercourse is by maritime traffic. Thus the southernmost point of Florida, which has been for at least half a century nearest a large leper colony, has harbored far fewer cases than has either San Francisco or New York. The numbers represented in a group of the Northwestern States illustrate the tide of settlement of Scandinavians deflected around the great lakes in their transit from New York to a country and climate approximated to that of the Swedish and Norwegian peninsula.

It is a much more difficult task to form even an approximate estimate of the number of lepers living to-day on the soil of this country. Under date of the 13th of March of the present year Dr. H. R. Brown, of the Health Department of the city of San Francisco, reports that there are but eleven lepers in the pest-house of that city: two from Hawaii, one from Finland, one from Mexico, one from Madras, and six from China. Dr. J. R. Laine, of the California State Board of Health, supposes that there are perhaps fifteen others in the entire State. This would give a total of twenty-six cases in California; and, in the view of the same authority, there has been no increase of the disease there in recent years. The proportion of these cases to those altogether reported from that State, 158 in all, may be, for the purpose of approximate estimate,

observed from some of the other figures collated. In this way it may be computed that there should be ninety-two lepers now alive in the country. There are actually two lepers in Florida; and usually from one to three in Illinois, and the same number in New York. One is known to be in Texas, two in Idaho, two in Pennsylvania, four in South Carolina. There are probably more than threescore of lepers in Louisiana, and less than half that number in the States of the Northwest named above. This suggests an approximate estimate of between one hundred and two hundred cases of leprosy. Competent observers have estimated that the total number is between ninety and one hundred and fifty. It can scarcely be doubted that in each of the last fifteen years there have rarely been fewer than one hundred lepers living within the territorial borders of our country.

These figures are to be viewed neither with the hysterical alarm of the timid nor with the careless indifference of the unwary. They call for intelligent discussion and for a wise provision, alike for the need of the unfortunate leper and for the safety of the community in which the infected are now living. There are greater problems presented to the physicians of America than those growing out of these interesting statistics. Tuberculosis alone exposes at present, to a greater danger than lepra, the health of our population. But enough lepers are now sheltered upon this soil to offer a menace to the welfare of its inhabitants and to propose a problem in State and sanitary science which I believe the General Government alone can rightly solve.

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THE DIAGNOSTIC FEATURES AND TREATMENT OF LEPROSY.

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THE clinical picture of leprosy drawn by many of our text-book writers is that of a disease as readily recognizable by its typical features as it is repulsive by its hideous deformity. This common conception is derived from examples or representations of the disease in its fully developed or final stage. With its initial manifestations and the varied

¹ Presented before the General Session of the Congress of American Physicians and Surgeons, Washington, May 30, 1894.

phenomena exhibited in the earlier stage of its evolution, few medical men in this country are familiar. While it is undoubtedly true that the clinical features of a case of leprosy typical in its development and advanced in its evolution are so striking and characteristic as to be absolutely pathognomonic, it is equally true that in its earlier stages, and even in fully developed cases with atypical manifestations, there is no disease in the entire domain of pathology more difficult of recognition. It is precisely this latter class of cases which have a most important relation to the general subject now under discussion. Leprosy in this country is essentially of exotic origin, and Dr. Hyde has told you that the vast majority of lepers in North America are imported cases. Dr. White will doubtless urge the establishment of a rigid quarantine against the immigration of lepers as the most effective prophylactic measure. In the writer's opinion, however, no system of quarantine can be instituted sufficiently searching and rigid to exclude a disease so little manifest on ordinary examination as leprosy.

Mr. Jonathan Hutchinson states that on the occasion of a visit to the Leper Hospital in Norway, he examined a number of the inmates who appeared to him perfectly well. Asking to be shown the means by which identification was arrived at, little brown patches, sometimes a single patch on the limbs, were pointed out, which were anæsthetic in their centres. Referring to the efforts then being made by the United States authorities to prevent the ingress of lepers, by the inspection of all Norwegian immigrants before they were allowed to land, the Bergen physician said: "They only recognize bad forms, and these but seldom go over; they don't know such cases as these."

It will be my object in this paper to consider more especially the diagnostic signs of the disease at an early stage, when they are so little manifest on ordinary examination as to escape identification.

The difficulties which attend the diagnosis of leprosy depend upon its prolonged period of incubation, the absence of any initial lesion that might connect it with a known exposure, the indeterminate character of its prodromal symptoms, and, finally, the multiplicity and variety of its manifestations. The fact that leprosy is essentially a proteiform malady is not sufficiently appreciated. While syphilis may surpass it in the number and variety of its eruptive elements, the cutaneous manifestations of leprosy most accurately imitate many of the ordinary dermatoses. This imitation is carried into the realm of neuro-pathology; nerve leprosy simulating most deceptively the manifold forms of neuritis of toxic, traumatic, and constitutional origin. The earlier manifestations of leprosy, unlike those of syphilis, are in no sense "specific" or peculiar to the leprous process; there is nothing regular in their mode of evolution, nothing constant in their appearance, nothing distinctive in their morphological characters; they are so variable, uncharacteristic, and

absolutely indefinite, that they would never be ascribed to leprosy in any country where the disease was not endemic, or there were not decided reasons for suspecting its presence.

As is well known, the lesions of leprosy chiefly affect the skin and nerves, and according to the determination of the morbid process toward the cutaneous or nervous system, two principal forms are recognized.

The prodromal symptoms of the *tubercular form* possess but little diagnostic value; they may be so slight as to escape recognition. The malaise, general debility, vertigo, digestive disorders, fever, etc., are common to other diseases. The febrile movements, formerly ascribed to cold, damp, or malaria, we now recognize as due to the invasion of new parts of the body by the bacilli, and the toxic effects produced by their emanations.

The prodromal symptoms of the *anæsthetic form* are much more variable, and quite as uncharacteristic. They consist chiefly of disorders of sensation, hyperæsthesia, formication, pruritus, and sensations of burning, tingling, and numbness. The pain and motor weakness often present are ascribed to rheumatism or neuralgia. In both forms symptoms referable to changes in the mucous membranes of the upper air-passages, slight hoarseness, rhinitis, epistaxis, etc., not infrequently precede the outbreak of any eruptive accident.

The first objective signs of leprosy are usually manifest in the form of erythematous spots or patches of variable size, shape, and color. These spots almost invariably make their first appearance upon exposed parts, the face, hands, and feet; later they become more generalized. The exanthem sometimes resembles that of the eruptive fevers. I have recently seen a case in which the initial rash had been diagnosticated as measles, from which it was differentiated by its persistence. For three years it faded and reappeared a number of times in the form of erythematopapular lesions, before the characteristic tuberculation took place. Still another, in which the right side of the forehead and cheek was occupied by slightly raised erythematous patches of a sombre-red color, simulating perfectly lupus erythematosus. In the tubercular form the spots may come and go a number of times before remaining permanent or becoming the seat of tubercles. They are to be differentiated from the lesions of exudative erythema and the macular syphilide by their localization and their slower involutive changes.

The erythematous spots of the *anæsthetic form* are characterized by their permanence, their tendency to clear in the centre while spreading peripherally, their achromic changes, and later, by their anæsthetic centres. They are to be distinguished from the patches of chromophytosis, morphœa, and vitiligo.

Months or years may intervene between the first appearance of leprous erythema and the development of tubercles. The tubercles, which constitute the most specific sign of this form, may develop upon the erythem-

atous patches, or upon previously clear surfaces. They vary in form, color, consistence, and in size from a pin-head to that of a small nut. The tubercles may remain stationary or progressively enlarge. After their full maturity they may undergo spontaneous resorption and reappear a number of times. They may soften and break down, forming shallow or deeper ulcers, or they may undergo a fibrous induration into small hard masses, which persist indefinitely. They may be discrete or aggregated in patches. Their seats of predilection are the facial mask and the extremities, but they are not confined to these regions. Situated along the external malleolar region and in front of the leg, they bear a most deceptive resemblance to the nodules of erythema nodosum. When small they have been mistaken for the papules of lichen planus, acne indurata, rosacea and sycosis. When larger the tubercles may resemble the tumors of molluscum fibrosum, sarcoma, carcinoma, mycosis fungoides, syphilis, and lupus vulgaris.

The diseases with which leprosy is most apt to be confounded are syphilis and cutaneous tuberculosis, with which it shares the pathological peculiarities of cell infiltration of the connective tissues, followed by disintegration of the morbid products and ulceration.

The lenticular tubercles of leprosy resemble absolutely the small papular syphiloderm. The tubercular syphilide, which bears the most deceptive resemblance to leprosy, is distinguished by the more rounded contour of the lesions, their development in circular or crescentic forms, their absence from the lobes of the ears, and their more general distribution. The ulcers of syphilis are more rounded, more superficial, and more circumscribed in extent. The ulcerations of leprosy do not present a serpiginous mode of extension. Lupus is distinguished by its occurrence in the form of isolated patches, and its more limited localization. In all doubtful cases of tubercular leprosy, the demonstrable presence of the bacilli in the tissues or liquid exudates establishes the diagnosis.

An early manifestation of the anæsthetic form is a bullous eruption, which may even precede the erythema. It is to be distinguished from pemphigus vulgaris. Frequently the first indication of the disease, especially in children, is the existence of burns, scalds, or other traumas which the patient has received unconsciously. In tropical countries where patients go barefoot, the so-called plantar ulcer is often an early sign.

The phenomena of nerve leprosy are essentially those of multiple neuritis; they consist of hypertrophy and nodular infiltrations of the nerve cords, readily recognizable in the ulnar and peroneal nerves, paralyzes of special nerves, with atrophic and degenerative changes of the muscles, giving rise to contractures, and the peculiar "bird-claw" deformation of the hands. Anæsthetic leprosy has been mistaken for progressive muscular atrophy, arthritis deformans, hysterical paralysis, mutilating

scleroderma, Raynaud's disease, syringomyelia, etc. The lesions of the bones and joints, with the mutilations and deformities which commonly occur in the advanced stage, can scarcely be confounded with the clinical picture of any other disease. As the bacillus cannot be demonstrated in the lesions of nerve leprosy, anæsthesia constitutes the most important diagnostic feature of this form. Since leprosy is exclusively human in its origin, the history of known contact with a leper, or of residence in a leprous country, is of great diagnostic worth.

In this necessarily brief sketch, I have been compelled to pass over the leprous manifestations of the mouth, nose, and throat, the ocular lesions, the changes in the cutaneous glands, the alopecia, the visceral complications, and other pathological coincidences which furnish important diagnostic indications. Want of time also forbids more than a passing allusion to those *atypical* forms of the disease in which a deviation from the normal plan of evolution introduces an element of confusion. While as a rule the lesions of leprosy are more or less symmetrical, cases are met with in which the manifestations are strictly unilateral. I have had under observation a case in which twelve years after infection the only symptoms were dystrophia and anæsthesia of the right hand, forearm, and ankle; another of ten years' duration, in which the manifestations were limited to three or four erythematous patches with anæsthetic centres on the left side; still another, in which the sole signs of the disease were a single tubercle on the right cheek, and anæsthetic changes in the right hand.

TREATMENT.—It would be presumptuous in a medical man living in a country where leprosy is not endemic, to formulate conclusions as to its treatment based upon his own necessarily limited experience. For results possessing definite value, we must rely upon the clinical experience of competent medical men living in leprous countries, who have had opportunities of testing remedies on a large scale and during a long period. Unfortunately, this clinical testimony, instead of being conclusive, is of the most conflicting and contradictory character.

In estimating the value of treatment certain possible sources of error should be considered. The study of the natural history of leprosy, abandoned to its own evolution and uninfluenced by treatment, shows that it does not pursue a progressive, uninterrupted course: the morbid process alternates between activity and repose; it often presents remissions sufficiently prolonged and complete to give deceptive indications of a cure. It may be formulated as a general law that recessions are the rule in leprosy, especially in the earlier stages. If a remedy happens to be given when such a remission is about to occur, the observer is apt to attribute the spontaneous subsidence of symptoms to the treatment employed. On the other hand, if the treatment is instituted coincidentally

with an exacerbation or new outbreak, it is condemned as a failure. In the writer's opinion, the claims of most of the remedies which have been vaunted as "specifics" in leprosy, are largely based upon *post hoc* conclusions as to results, which, rightly interpreted, are mere coincidences.

Without passing in review the vast number of drugs and methods of treatment which have been employed, we will glance at the clinical testimony in regard to a few which at the present day are most in repute.

Chaulmoogra oil perhaps ranks highest in professional esteem. It is claimed by Beaven Rake and most European observers, that under its prolonged use discolorations clear up, leprous nodules undergo involution, ulcers heal, and there is a notable amelioration of all symptoms, while Bidentkap, Daniellsen, and other experimenters have been disappointed with its results. Of gurjun oil, which enjoys such a high repute in India, Hillis states that it is a most valuable agent in all forms of leprosy, exercising a specific action upon the sweat glands, evidenced by increased perspiration and return of sensation in the anæsthetic areas. This opinion is concurred in by many of the civil surgeons in India. On the other hand, Drs. Beaven Rake, Vandyke Carter, and others, depreciate its value, declaring that the results are disappointing. Salol, so highly extolled by Lutz in arresting the leprous fever, causing the eruption to disappear and the ulcers to heal, is as strongly condemned by Dr. Cook, Superintendent of the Leper Hospital in Madras, who, after an extensive experience, declares: "Salol is, in my opinion, of no therapeutic value in leprosy; in fact, a decided failure." So with the entire list, salicylic acid, carbolic acid, creosote, crude petroleum, the sulpho-ichthyolate of ammonium, arsenic, etc.: highly praised by some observers, they are by others, equally competent, condemned as useless or harmful.

We thus perceive that among men who have had the largest opportunities for experiment, there is a most woful lack of unanimity as to the value of any of these various remedies.

In this country and Europe the therapeutic problem is complicated by the modifying influence of climate upon the course of the disease. It is a matter of observation that most lepers who come to this country get better, for a time at least, with or without medication, and when treatment is employed it is difficult to differentiate between its effect and that of climate and improved modes of living. Thus in a case of pronounced tubercular leprosy referred to me some two years ago by a colleague in New York, the cutaneous manifestations entirely disappeared within a few months under the influence of large doses of chaulmoogra oil internally, with daily baths and inunctions of gurjun oil. In another patient referred to me five years ago by Dr. Besnier, of Paris, there has been an apparent cure from the use of phosphide of zinc and strychnine. It is difficult to determine what precise measure of curative influence should be ascribed to the drugs in these cases, since in another case, under

observation for two years, there was an arrest of the symptoms under the influence of hot baths, massage, and general hygienic measures—no drugs whatever having been administered.

CONCLUSIONS.—For purposes of conciseness, the writer's views may be summarized in the following conclusions:

1. From the standpoint of scientific therapeutics, a clear conception of the pathogenesis and pathological anatomy of leprosy is an essential condition in formulating the principles of rational treatment.

2. It is now generally conceded that Hansen's bacillus is the active, efficient cause of leprosy, and that the presence of the bacilli in the tissues sets up either directly, or indirectly through their toxins, the vast array of organic changes and functional disorders peculiar to the disease.

3. There is no substance known to science which, introduced into the body, is capable of destroying the bacilli without destroying the living cells which contain them.

4. Furthermore, from the nature of the pathological changes and the position of the bacilli in the deeper tissues, it is evident that no germicidal agent can be brought into direct contact with the pathogenetic organisms, and hence all treatment which has for its object the destruction of the bacilli is impossible of application.

5. The treatment of leprosy by injections of tuberculin has been disappointing in its results. Experiment has shown that the action of tuberculin is positively pernicious in setting free the bacilli in the tissues and determining the development of new foci of the disease.

6. The treatment of leprosy is essentially empirical; whether, as has been claimed, certain remedies act by virtue of their sterilizing properties upon the living tissues, rendering them unsuitable to the growth and multiplication of the bacilli, cannot be determined.

7. The more or less rapid development of leprosy depends upon the resistance of the tissues to the inroads of the bacilli. In exceptional but well authenticated cases, this capacity of resistance is sufficient to dominate and destroy the pathogenetic microbes, as shown by the observation of abortive cases in which indubitable signs of the disease definitely disappear and never recur.

8. This capacity of resistance may be strengthened by change of climate, improved habits of living, and measures calculated to build up and maintain the general health at the highest standard.

9. Observation shows that the removal of a leper from an infected district to a more favored climate exerts a marked modification upon the course of the disease; there is, for a time at least, an arrest or retrogression of the symptoms. This lull in the manifestations is, as a rule, disappointing in its duration. Of the one hundred and sixty Norwegian lepers who have emigrated to this country, there is no record of a single definite cure.

10. A dry, moderately cool, mountain atmosphere is most favorable in its influence upon the disease. A hot moist climate, or a damp cold climate are both unfavorable.

11. A nutritious diet of fresh meat and vegetables, warm clothing, exercise in the open air, freedom from exposure to damp and cold, are important elements in the hygienic course of treatment.

12. The care of the skin by frequent hot baths, massage, with inunctions of oils, etc., should receive as much attention as the constitutional treatment.

13. The special remedies which clinical experience would indicate to be of the most value, are chaulmoogra oil, gurjun oil, arsenic, and certain agents of the strychnos family; all are, however, more or less disappointing in their results.

14. All observers agree that in advanced cases, where general dissemination of the bacilli has taken place, curative treatment is absolutely futile. The most favorable conditions are that treatment be instituted early, and that it be prosecuted actively and energetically during a prolonged period.

15. The surgical treatment of leprosy sores, necrosed bones, perforating ulcers, the excision of tubercles, amputation of the members, tracheotomy, various delicate operations about the eye, nerve-stretching for the relief of pain, the removal of threatening complications, are of the most signal benefit.

16. Finally, we may conclude that while medical science holds out no definite promise of cure to the leper, its resources are sufficient to arrest or retard the progress of his disease, to promote his comfort, and to prolong his life.

A CLINICAL AND EXPERIMENTAL STUDY OF URÆMIA.

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(Continued from p. 193.)

PATHOGENESIS.—At the outset we are confronted by the possibility that uræmia may be due to purely mechanical causes, a theory brought to its highest perfection by Traube, who holds that it is the result of œdema of the brain and consequent anæmia, brought about by the watery condition of the blood, coupled with the increased arterial tension.

Mahommed has further elaborated this by adding a cause for convulsions in numerous punctiform hemorrhages into the gray substance of the brain.

This theory, while it may serve to explain some of the phenomena, most notably localized palsies, can by no means be made to fit into all the facts. Three insuperable difficulties are met with. The conditions under which uræmia arises are so diverse that by no possibility can the same mechanical condition of the brain obtain in all of them. The accumulating evidence of post-mortem examinations negatives the assumed facts. Experimental observations have failed to bear out the theory, so that we are forced to discard this mechanical theory and take refuge in the other, that uræmia is due to substances circulating in the blood. This brings us face to face with another problem: Are these substances constantly present in the blood or do they arise under exceptional circumstances? First, let us consider under what conditions uræmia arises. These may be briefly summarized as (*a*) conditions in which the kidney is diseased and (*b*) those in which its secretion, from other causes, is diminished. We look then naturally to the constituents of the urine for the uræmia-producing substances. Urea, the most important constituent and the one from which the name is derived, cannot be considered the sole, nor, indeed, even the principal, cause. It is not constantly present in excess in the blood of uræmiacs. Uræmia may arise during the free excretion of urea. Experimentally it fails to produce the typical symptoms. Then urea is one of the most powerful diuretics known, and its effect would be rather to relieve than produce uræmia. Carbonate of ammonia, a derivative of urea, brought forward by Frerichs as the cause of uræmia, has greater objections even than urea. It is only exceptionally present in the blood. The injection of large quantities of urea will not be followed by the appearance of carbonate of ammonia. Its formation in the blood presents insuperable difficulties, unless, as was held by Freitz, the conversion of urea into carbonate of ammonia takes place on the gastro-intestinal mucous membrane, whence it is absorbed. But even this would not outweigh the first two facts urged against it.

Landois sprinkled kreatin and kreatinin on the exposed brain centres and got symptoms of uræmia. But our experiments quoted during the consideration of temperature, with the injection of these substances, were negative, no effect whatever being produced. The effect obtained by the local application was evidently due to mechanical or chemical irritation, and kreatin and kreatinin are not uræmia-producers. Thus, then, none of the better known constituents of urine are the ordinary causes of uræmia; and yet urine is distinctly poisonous, as has been determined by Bouchard in his most elaborate series of experiments. He suggests the existence of seven poisons, diuretic (urea), narcotic,

sialagogue, myotic, temperature-reducing, and two convulsants, one of which is a potash salt. These poisons, he thinks, are largely alkaloidal. In addition, he determined the fact that the toxicity varies widely, being least during sleep. In some of the specific fevers the toxicity is immensely increased, while in Bright's disease it is diminished.

Laulainé and Chamberlent have shown that toward the end of pregnancy the toxicity is diminished. Favelier found that in children the urine is less toxic than in adults. Feltz and Ritter, who were the first systematic investigators of urinary toxicity, thought the toxic substance was the potash salts; but this Bouchard has disproven. Here we see that while urine is toxic, yet there is a multiplicity of toxic substances, and that their nature is not yet determined. These toxins are probably pre-formed in the blood, for, without limiting its powers merely to filtration, yet it is likely that the office of the kidney is to separate excrementitious substances from the blood and not to create. As the toxicity of the urine varies so appreciably in health, it is probable that disease may still further disturb it, increasing it vastly or even adding new toxins. Hence the possibility of the existence of uræmia without kidney lesion, the result of an over-production of toxic substances. Here let us introduce our experiments upon the production of uræmia:

EXP. XXX.—9.30 A.M. Patient who had been in uræmic condition for several days was bled freely, and the blood whipped with all precautions of antisepsis. This blood was then injected into the jugular vein of a dog weighing 32 pounds, as follows:

- 11.00 P.M. Dog very lively and in perfect health.
- 11.15. Injected 10 c.c. per jugular vein.
- 11.16. Injected 10 c.c. per jugular vein. Urination, defecation, and vomiting. Respiration very irregular, at first slowed, and then later quite rapid.
- 11.20–11.25. P.M. Injected 30 c.c. Seems very sick.
- 11.30. Vomiting; heart irregular. Dog will not respond to calling, and makes no effort to get up when untied.
- 11.40–11.50. Injected 60 c.c. per jugular. Vomiting continuous.
- 11.55–12.00. Injected 100 c.c. Seems very sick.
- 12.05 A.M. Injected 150 c.c.
- 12.30. Condition remains the same. Frequent vomiting and purging. Deeply comatose. Died at 11 A.M. next day.

Autopsy showed brain normal. Lungs contain numerous hemorrhagic infarcts. Heart apparently normal, containing currant-jelly clots. Spleen normal. Liver showed a number of areas much lighter in color than the rest of the organ. Kidneys were both greatly enlarged, cortex swollen, whole organ so hemorrhagic that one cannot make out the pyramids. Blood exudes freely from surface of section on slight pressure. Bladder contained about ½ of black urine which contained vast numbers of red blood-cells, blood-casts, and granular matter.

As in this case we had introduced whipped blood containing corpuscles, we made the following control experiment to see the effect of introducing whipped blood from a man without uræmia into a dog.

- EXP. XXXI.—Dog, weight 27 pounds. (Bled a case of lead-poisoning.)
- 12 M. Dog lively. Temp. 39.4° C.
- 12.20 P.M. Injected 10 c.c. whipped blood per jugular.
- 12.22. Urination.

- 12.23. }
 12.30. } Injected 10 c.c. per jugular.
 12.33. }
 12.34. }

Dog untied; runs about the laboratory, and seems as lively as before the injection.

12.45. Injected 30 c.c. per jugular. No effect.

12.57-1.00. Injected 50 c.c. Temperature 39.1° C. As bright and playful as before the injection.

1.15. Injected 30 c.c. per jugular.

1.40-1.50. Injected 75 c.c. per jugular. No effect.

2.00. No symptoms. Urine dark in color. Temperature 39.1° C.

EXP. XXXII.—Same dog as in Experiment XXXI. Weight 30 pounds. The case of lead-poisoning which had been bled for the control Exp. XXXI. developed suppression, only passing two ounces of urine in twenty-four hours. At the end of twenty-four hours, before any uræmic symptoms had appeared, he was bled and the blood allowed to clot. The serum was then injected into the same dog.

1.10 P.M. 100 c.c. blood serum injected slowly into the jugular vein.

1.15. Intense retching; breathing slowly; pupils dilated; comatose..

1.22. Injected 50 c.c. serum into vein.

1.25. In deep coma. When untied makes no effort to get up.

1.30. Respiration rapid.

1.32. Injected 25 c.c. per jugular.

1.45. Remains in deep coma; heart weak; reflexes good. Does not respond to prick of pin.

2.00. In same condition.

2.30. Coma not so deep. Responds to prick of pin, but makes no effort to get up. Urine of normal color.

3.00. Condition the same.

3.12. Had a severe convulsion.

3.22. Died.

Autopsy: Lungs show three or four small hemorrhagic infarcts; liver and spleen normal; kidneys of normal size, slightly congested, especially the pyramids. Bladder contained about f3j of straw-colored urine which showed nothing on microscopic examination. There was considerable venous congestion of the membranes of the brain, otherwise brain normal.

EXP. XXXIII.—Black dog, weight 13 pounds.

1 P.M. Injected subcutaneously 60 c.c. of blood serum from a case of profound uræmic coma terminating fatally.

1.10. Retching, and vomiting of the contents of the stomach.

1.30. Very dull, seems quite sick.

2.00. Persistent retching; copious vomiting of serous matter.

Placed 60 c.c. of blood serum in a dialyzer with 60 c.c. distilled water. Next day, 1 P.M., injected subcutaneously 60 c.c. of water of dialyzer into same dog. Observed for several hours; no effect. Next day (seventy-two hours after the bleeding) injected the 50 c.c. of blood serum of dialyzer into the same dog without any effect.

EXP. XXXIV.—An old drunkard with long-standing nephritis, cirrhotic liver, and atheromatous arteries was admitted to the hospital with delirium tremens. Urine contained much albumin and hyaline and granular casts. Was passing eight ounces of urine in twenty-four hours, and soon developed uræmic symptoms. Had marked ascites. Was tapped and rapidly improved.

Dog, weight 31 pounds.

2.30 P.M. Temperature 38.8° C.

2.45-2.50. Injected per jugular vein 50 c.c. ascitic fluid.

3.00. No effect.

3.05-3.20. Injected 100 c.c. No effect.

3.50. Injected 200 c.c. Free salivation; retching; very sleepy.

4.00. Retching and vomiting continue.
 4.20. Injected 50 c.c. Temperature 39.6° C.
 4.30. Injected 75 c.c.
 4.50. Very drowsy. Temperature 40.5° C. Urinated very freely. Some vomiting and severe purging continued all the next day.

EXP. XXXV.—Dog, weighing 32 pounds.
 2.12 P.M. Temperature 38.3° C.
 2.20–2.25. Injected per jugular 50 c.c. ascitic fluid as in Exp. XXXIV.
 2.55. Injected 100 c.c. No effect.
 3.15. Injected 100 c.c. Seems dull.
 3.40–3.45. Injected 100 c.c.
 4.00. Vomiting—serous and food ingested. Seems quite ill. Temp. 39.9° C.
 4.20. Injected 50 c.c.
 4.45. Much sicker. Severe purging. Temp. 39.5° C. Purging and vomiting continued all night and all next day.

EXP. XXXVI.—One week after tapping patient in Exp. XXXIV., the uræmic symptoms had entirely disappeared, but he had ascites again. Was tapped again.

Same dog as in Exp. XXXIV.
 3 P.M. Injected 200 c.c. ascitic fluid.
 3.15. No effect.
 3.20–3.40. Injected 200 c.c.
 3.50. Injected 150 c.c. Dog observed for two hours. Does not seem to be affected in any way. No symptoms next day.

EXP. XXXVII.—Same dog as in Exp. XXXV.
 2.45 P.M. Injected per jugular 100 c.c. same ascitic fluid as in Exp. XXXVI.

3.00. No effect.
 3.15. Injected 100 c.c.
 3.45. Injected 150 c.c. No effect at all.

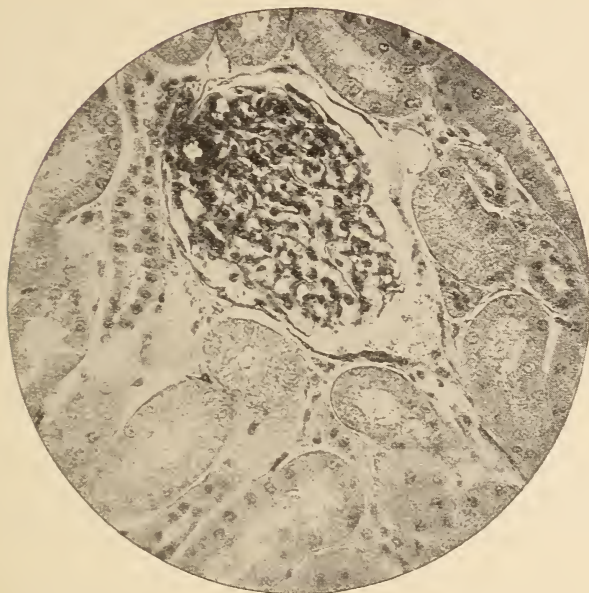
EXP. XXXVIII.—Young dog, weighing 26 pounds. Ligated both renal arteries with all precaution of antisepsis that can be carried out in the laboratory. The operation is not a very severe one, and the animals do not suffer from shock. In some of the experiments both artery and vein were ligated, but usually, as in this experiment, only the renal arteries were ligated. In twenty-four hours the dog seemed very sick, but still walked about. He vomited and purged rather freely. At the end of forty-eight hours it was noticed that he would avoid large objects, but would run against small ones in walking—in other words, he had a central blindness and peripheral vision. His eye-grounds were examined by Dr. James Wallace, who found areas of fatty degeneration in the retina, such as are seen in advanced Bright's disease. There were no hemorrhages and no retinitis.

This dog was then bled to death, and blood allowed to clot. 75 c.c. of the blood serum injected into a dog, weighing 13 pounds, made him quite dull, and he appeared sick (dog had been very lively before).

75 c.c. of the serum, undiluted, was placed in a dialyzer with 75 c.c. of distilled water. The dialyzer was kept in a cool place for twenty-four hours. At the end of this time, 75 c.c. of the distilled water was injected into the same dog, weighing 13 pounds, producing absolutely no symptoms. But the 75 c.c. of blood serum from the dialyzer, injected into the vein of a dog weighing 26 pounds, produced in fifteen minutes severe retching which lasted several hours, and was attended with considerable vomiting.

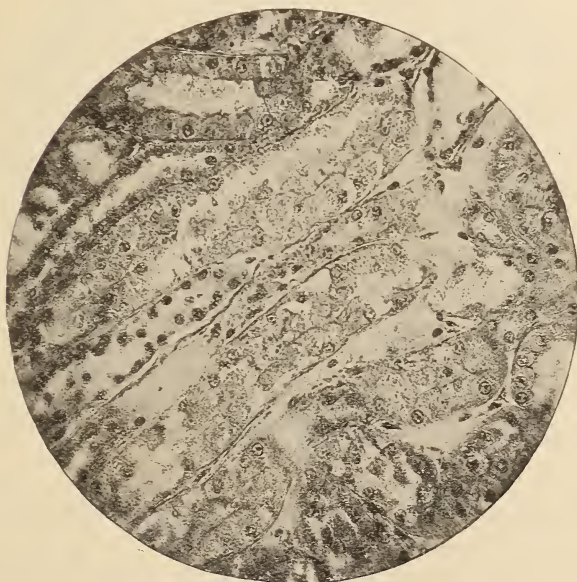
EXP. XXXIX.—Dog, weighing 24 pounds. Ligated both renal arteries. At end of twenty-four hours dog showed great thirst. Drinks water and vomits it immediately. Has been vomiting and purging some little, but is not yet very ill. At the end of forty-eight hours was found in a violent convulsion. Had three convulsions in a half-hour. Was bled to death, but by an accident the blood serum was lost.

FIG. 1.



Convoluted tubules of kidney of dog injected with blood serum of another dog made uræmic by ligation of renal arteries.

FIG. 2.



Collecting tubules of the same kidney.

This was the only case in which we have observed convulsions in the uræmia resulting from ligation of the renal arteries. In several cases we have produced convulsions by the sudden introduction of uræmic serum. The ligation of the renal arteries produces in dogs a condition of uræmia apparently the same as that occurring in man. The symptoms appear in a striking way by the end of twenty-four hours, and death results in from thirty to seventy-two hours. We have produced uræmia in this way in thirteen dogs, some dying before we had the opportunity of bleeding them to death. In the only case in which uræmia did not immediately follow the ligation, there was found an anomaly of two renal arteries to one kidney, and only one had been ligated. The most constant symptoms in these animals are those of the gastro-intestinal tract and the stuporous condition. The blood serum of these animals produces uræmia in other previously healthy animals, just as is produced by the blood serum of men in the condition of uræmia. The following experiments show this.

EXP. XL.—Bled a dog to death ten hours after the ligation of the renal arteries. Blood allowed to clot in the ice-chest. (Of course, in all these experiments the bleeding was done with great care by means of a sterilized glass canula, the blood received in a sterilized flask, and then kept in the ice-chest.)

5.20 P.M. Injected per jugular vein 50 c.c. of this serum into a dog weighing 16.5 pounds.

5.30. Injected 50 c.c.

5.40. Profuse salivation; seems sick; will not stand up when untied.

6.00. Salivation and stuporous condition continue.

In the next four experiments the blood was obtained from three large dogs, twenty-four hours after the ligation of their renal arteries. As they all had the same symptoms (vomiting, purging, and stupor) their blood was mixed and allowed to coagulate.

EXP. XLI.—Dog weighing 28 pounds.

4.45 P.M. Pulse and respiration both slow.

4.50. Injected per jugular 200 c.c. blood serum mentioned above.

4.55. Respiration and pulse remain the same.

4.56. Injected 100 c.c. Muscular tremors; respiration continues slow; pulse very rapid and weak.

5.10. Vomiting.

5.15. Purging; seems very sick. Retching and purging continued several hours.

EXP. XLII.—Dog, weight 26 pounds.

5.15 P.M. Injected 100 c.c. same serum as that used in Exp. XLI. heated to 58° C. for five minutes. No effect from injection.

5.18–5.23. Injected gradually 100 c.c.

5.25. Injected 100 c.c. No effect. When untied runs about room and seems as lively as before the injection.

EXP. XLIII.—Dog, weight 24 pounds.

3.40 P.M. Injected per jugular vein 200 c.c. of serum, obtained as mentioned above, which had been in a dialyzer for thirty-six hours in a cool place, and had been diluted with distilled water before being placed in the dialyzer.

4.00. No effect, except some muscular tremor.

4.10. Some purgation.

EXP. XLIV.—Dog, weight 22 pounds.

4.25 P.M. Injected slowly per jugular vein the distilled water of the dialyzer, 150 c.c. There were no symptoms at any time.

EXP. XLV.—Dog, weight 20 pounds. Large dog, was bled to death twenty-four hours after the ligation of renal arteries.

4.00. P.M. Injected per jugular 75 c.c. of this serum heated to 50° C.

4.30. Free salivation.

4.40. Purging and vomiting.

These gastro-intestinal symptoms continued for some hours. Dog recovered.

EXP. XLVI.—Dog, weight 23 pounds.

2.33 P.M. Injected per jugular vein 25 c.c. urine of case of subacute Bright's disease. Pulse slowed.

2.34. Injected 50 c.c.

2.35. Injected 100 c.c.

2.36. Injected 50 c.c.

2.38. Injected 100 c.c.

Pulse much slower and pressure lowered after each injection, but it immediately returned to the normal.

2.41. }

2.42. } Injected 50 c.c.

2.43. }

2.45. Injected 75 c.c.

2.57. }

3.00. } Injected 50 c.c.

3.05. }

The respiration became slower and the pulse more frequent in the latter part of the experiment. Notwithstanding the enormous quantity injected the blood-pressure always recovered itself. While the dog did not seem as bright as usual when untied, the only prominent symptom was a profuse diuresis. The dulness lasted several hours and then entirely disappeared.

FIG. 3.



Kidney of dog injected with blood serum of woman having Bright's disease, but without uræmia (Exp. XLVII.). Hardened in Fleming's solution. Showing marked fatty degeneration.

EXP. XLVII.—Bled a woman with chronic parenchymatous nephritis, who had never had any other symptom of uræmia than headache.

Injected 250 c.c. of the blood serum into jugular vein of a dog weighing 25 pounds. There were no symptoms resulting from the injection.

FIG. 4.



Collecting tubules of same kidney; also showing fatty degeneration.

EXP. XLVIII.—Dog, weight 15 pounds. Injected subcutaneously 50 c.c. blood serum from a case of uræmia, comatose in type. These injections were repeated on each of the three days following. At the seat of each of these injections there was developed an abscess, although the ordinary antiseptic precautions had been taken.

On the fifth day injected per jugular vein 100 c.c. of the serum. The dog became very ill, but did not die. He had showed no positive symptoms until this last injection.

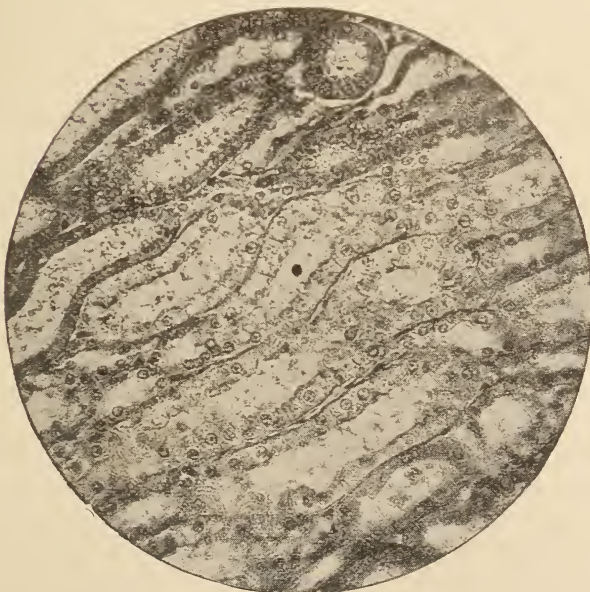
A review of the results of these experiments shows that ligation of the renal arteries in dogs is followed by a progressive fall in blood-pressure and by the constant development of a set of symptoms preceding death, identical in all instances. Serum obtained from the blood of such dogs, or the blood itself injected into other dogs, will produce in these latter a series of exactly similar symptoms, terminating in death if the amount of injecting fluid be large enough. Not only this, but if blood drawn from uræmic human beings be injected, a similar set of phenomena will follow. Or if ascitic fluid obtained during an attack of uræmia be used, the same result will be brought about. If, however, ascitic fluid which has reaccumulated after the uræmia has subsided be used, no such result can be obtained. Whether the fluid is injected subcutaneously or intra-venously makes no difference whatever in the

FIG. 5.



Convoluted tubule of kidney of dog injected with blood serum of man with uræmia.

FIG. 6.



Collecting tubules of same kidney.

state of affairs resulting; the symptoms are exactly similar; possibly they follow somewhat more promptly on an intra-venous injection, but they nowise differ in character or intensity. These symptoms, without going into them in wearisome detail, are those which are referable to the brain and to a condition of the brain which is evidently brought about by the action upon it of some poisonous substance—dulness, coma, loss of muscular power, muscular twitchings or even general convulsions, and disturbances of the gastro-intestinal tract. They are so definite, so uniform, so closely analogous with the symptoms of human uræmia, that it cannot be doubted that we have to deal in them with an artificially produced uræmia. Some of the symptoms developed are worthy of special attention. They are those connected with the gastro-intestinal tract, which in this experimental uræmia are much more uniformly prominent than in human uræmia. Evidently the vomiting and purging, from the character of their onset and their close association with other nervous symptoms, are not altogether an attempt at vicarious elimination, but partly at least centric. Salivation is prominent, differing here from human uræmia, where it is rare.

What is the nature of this uræmia-producing poison? That we have been dealing with one poison, present equally in uræmic human blood, dropsical effusions in uræmia, and in dog's blood in experimental uræmia, is made evident by the perfect similarity of its action. That this poison cannot be one of the ordinarily recognized constituents of the urine, as has been hitherto believed, nor even the sum-total of all these urinary constituents, is proven by the fact which we have demonstrated, that the injection of these constituents or even of urine itself will not produce uræmia; while such injections, if the amount used be inordinately large, will produce certain symptoms, yet these symptoms are not comparable in degree or kind with those produced by the injection of uræmic serum, and they do not constitute the condition which we recognize in man as uræmia. Thus, then, we have in uræmia to deal not with an intoxication due to a retention of urine or its constituents in the blood, but with a poisoning by a substance whose nature, or even, indeed, whose existence, has not yet been recognized. A clinical proof of this same fact is the possibility of the existence of uræmia while in the kidneys there is no demonstrable evidence of disease and normal amounts of normal urine are being secreted. While, however, the retention in the blood of substances ordinarily recognized as being excreted in the urine is not the cause of uræmia, yet after uræmia has been produced, such retention may in all probability have a certain effect, aggravating the already existing condition or determining its variety. The poison, then, must be a special one circulating in the blood under conditions which are not governed wholly by the action of the kidneys as it is evidenced in the urine. As to its exact nature, our

experiments have not progressed to the point where we can speak with entire confidence, but further work will undoubtedly clear this up. The facts that we have ascertained positively are that its uræmia-producing power is rendered abortive, or at least much lessened, by the moderate application of heat, and that it is not readily dialyzable. From the foregoing considerations there is at least probability in the assumption that it is some unknown low-grade product of metabolism or any one of a series of such products. From the effect produced upon it by heat and dialysis this seems to be an albuminous body. Clinical facts would seem to indicate that this poison is not constantly circulating in the blood, but that it is only exceptionally present, and that uræmia is induced by its slow and gradual accumulation in the blood, owing to an inability of the kidneys to excrete it, or more rarely to a sudden and enormous production.

Vastly more important even than the bearing of these experiments upon uræmia is their relation to Bright's disease. In the kidneys of dogs injected with uræmic blood serum, or dropsical effusion, there was found a uniform and constant condition. The cells of the tubules, both straight and convoluted, were swollen and granular, the cell walls lost, the nuclei indistinct or breaking down. In places the process had gone so far that the tubules, instead of being lined with a distinct layer of epithelium, were filled with a granular mass in which neither cells nor nuclei could be distinguished, presenting exactly the appearance of a tube-cast *in situ* in common examples of acute nephritis. This granular mass did not take the stain, and the granules failed to clear up on the application of acetic acid, nor did ether dissolve them. As a rule the granules did not take the osmic stain, but occasionally when the lesion was more advanced, owing to the larger amounts of poison employed, they were stained black, showing their fatty nature. Occasionally, too, the endothelium of the Malpighian bodies was proliferating and the tufts beginning to degenerate. Altogether, some of the cases suggested strongly a glomerulo-nephritis as we see it in man. All stages of the lesion could be traced from a beginning granular condition to a decided fatty degeneration; the effect produced upon the kidneys was the same in all instances, the lesions differing only in degree.

In injecting blood serum and urine from cases of Bright's disease where uræmia had not been a symptom, there was no uræmia produced, but there was found after killing the dogs the same lesions of the kidneys as had followed the injection of uræmic fluids. As a rule the lesions were not so marked as in uræmia.

As to the nature of this nephritis-producing substance. From its constant association in large amounts with uræmia it is probably the same as that producing this latter condition. When we obtained the kidney degeneration by injecting serum or urine from Bright's disease,

the amounts of injecting fluid used were much larger than in uræmia, so that although the uræmic poison must exist in small proportions here, yet by using larger amounts of the fluid enough of the substance might easily be obtained to affect the kidneys. While moderate heating abated so much of its toxicity as to prevent uræmia, yet it did not prevent nephritis, but the nephritis was not so marked as where heat was not employed. In the dialyzer, when the serum was freely diluted with distilled water, enough of the toxic substance came over to produce nephritis and not uræmia, but, as in heating, the nephritis was here not so marked as before dialyzation.

The demonstration of the existence of this poison, while it explains the origin of at least some of the forms of Bright's disease, explains also many things hitherto obscure as to the connection between uræmia and Bright's disease. If the same poison produces uræmia and nephritis, uræmia would be frequent in acute nephritis—which is a clinical fact—because it must require the presence of large amounts of the poison to produce such marked inflammatory condition of the kidneys, and a nervous system unaccustomed to the presence of the poison must of necessity be profoundly influenced. There being a sudden and probably temporary generation of these large quantities of the poison, it can be easily seen why such uræmia is so frequently recovered from, the poison being soon eliminated, and why such nephritis may completely disappear. Uræmia occurs most frequently during the course of chronic nephritis, not so much on account of a failure of the kidneys to perform their function as because of an unusual generation of the poison, though here probably, when the kidney secretion is blocked, the retention of the constituents of the urine aids in the production of uræmia. Here, too, from the conditions attending the presence of the poison, recovery is frequent. When, on the other hand, uræmia originates slowly at the end of a long-continued nephritis by a slow accumulation of poison, the termination is almost necessarily fatal.

Experiment XLVIII. was very interesting. Here the most marked kidney lesions were obtained, as well as fatty degeneration of the liver. This was the only case in which injection of serum produced abscesses, and this result was evidently connected in some way with an exceptional virulence of the poison, for in bleeding the uræmiac who furnished the serum some of the blood splashing upon the wrist of the operator and the hand of a nurse produced an erythema.

Last, in Experiment XXXVIII., along with the development of the uræmia came the characteristic fatty degeneration of the retina found in Bright's disease. So that albuminuric retinitis, instead of being the result of changes in the retinal vessels, is really due to the direct action of the poison producing uræmia and Bright's disease.

CONCLUSIONS.—1. Uræmia is an intoxication by a poison circulating in the blood.

2. This poison is present in serous effusions as well as in the blood.

3. It is probable that in addition to the pathogenic poison of uræmia there are, under certain conditions, other secondary ones active in its production.

4. The poison producing uræmia will also produce nephritis and a fatty degeneration of the retina, the cause of the eye symptoms in Bright's disease.

5. This poison is probably some albuminous substance. It is affected by heat and is only with difficulty dialyzable.

6. It is probable, but not certain, that this poison is not constantly circulating in the blood, but that under exceptional conditions it becomes developed.

7. It is possible to have uræmia without any previously existing lesion in the kidneys.

TREATMENT.—As uræmia is a poisoned condition of the blood, our efforts should be directed mainly toward the elimination of the poisons. But as their nature is not yet clearly understood, our treatment is still largely empirical, guided and controlled by what little theoretical knowledge we possess.

Convulsions, in addition to the general treatment of uræmia, will sometimes need a treatment of their own. As a rule a convulsion will end spontaneously, but occasionally it will be unduly prolonged, or one may follow another in rapid succession. Here the inhalation of chloroform, ether, or amyl nitrite will be advisable. Of these amyl nitrite is most easily given and is quickest in its action, but it possesses the disadvantage of being less reliable. Morphine in full doses may be used with advantage. While until within a short time its use in Bright's disease has been regarded as extremely dangerous, yet now it is clearly recognized that it is attended with comparatively little risk. Its effect must, however, be carefully watched, for we have unquestionably seen bad results from it. Especially where uræmia complicates fevers must the greatest care be used, for these are the cases in which it is most likely to do harm.

In considering the treatment for general uræmic symptoms, we have to guide us some useful hints derived from the symptoms. First, in those cases in which diarrhœa exists, the nervous symptoms are least likely to be pronounced. Second, the perspiration of uræmiacs frequently contains large quantities of urea.

Following out the first suggestion, then, the bowels are to be kept freely open, or even hypercatharsis produced. Vegetable purgatives have yielded us better results than mineral, besides being easier of administra-

tion. If calomel be used, it must be remembered that mercurial salivation is sometimes easily produced in Bright's disease.

Perspiration being the other channel for the elimination of urea, and possibly other excrementitious substances, it must be aided by every means at our command. These are the use of pilocarpine internally and the stimulation of the skin by local measures. Pilocarpine must be exhibited with great care, for its use is not unattended with danger. But recently we have seen a case where pulmonary œdema followed its use, and where a fatal termination was averted only by the most energetic measures. So that free sweating is most safely brought about by external heat, applied either by a hot-air bath or a hot pack. Of the two the hot pack has seemed to us rather preferable, producing less discomfort and exhaustion and being surer in its effect. A number of times we have noted cases in which free perspiration was brought about by a hot pack after a hot-air bath had failed. Outside of hospital practice the hot pack is certainly the more easy of application. Pilocarpine, in small doses, is often a most valuable adjuvant to either the hot-air bath or hot pack.

If there be pyrexia, heat should be most carefully applied, and the temperature constantly watched. If there be any rise such an attempt to produce perspiration must be abandoned. We have seen a case of moderate pyrexia where, owing to a misunderstanding, the patient was left in a hot-air bath for two hours. At the end of that time no perspiration had been induced, but the temperature had risen considerably. After removal from the bath the temperature continued to rise in spite of all efforts to the contrary, and death ensued when it reached 107.9° F.

As the poison is contained in serous effusions as well as in the blood, and as resorption of these effusions may throw enough of the poison into the blood to cause uræmia, it is necessary to withdraw effusions whenever met with, as early as possible. No condition of the patient will contraindicate tapping. It must be remembered that the symptoms of uræmia are manifold, and that not too much attention must be paid to them from any other point of view than that of uræmia.

Free venesection will abstract directly some of the poison; and, as a treatment, cannot be too highly recommended. Applicable to any form of uræmia, its good effect is most forcibly manifested in the grave cases. The existence of marked dyspnœa is its most urgent indication, and next the presence of prominent cerebral symptoms. It seems, from our experience, that it may abort a threatened attack of uræmia. A pronouncedly weak pulse will in no wise forbid its employment, for we have repeatedly seen the pulse strengthen while the blood was flowing. The quantity to be drawn will depend upon the exigencies of the case and the effect produced, being, as a rule, not less than a pint, or even a quart or more.

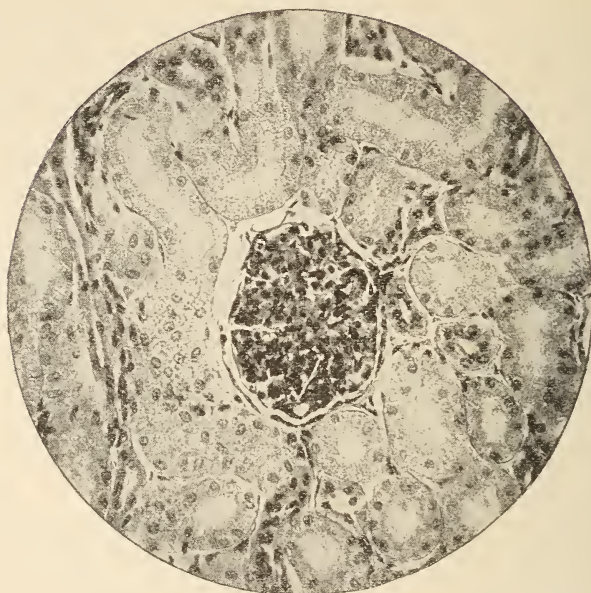
Bloodletting may be beneficially supplemented by transfusion of a normal saline solution. Especially is this valuable where the loss of blood threatens to weaken the heart too much. The saline solution is also diuretic, and may possibly be a direct antidote to the poison. The transfusion may be done intra-venously in exceptional cases when time is of importance; but this may entail some danger unless most carefully performed. Practised subcutaneously, it will be found that absorption is marvellously rapid. We wish to urge strongly this transfusion, for in our hands it has proven of the greatest good. In a case of pulmonary œdema, where its use would be theoretically contra-indicated, it was followed by a most prompt relief of the symptoms, which bloodletting alone failed to abate.

Diuretics are practically of no value. While the cessation of uræmia is attended by a re-establishment of renal secretion, this is a consequence rather than a cause of the cessation, and possibly the attempt to produce artificial diuresis may entail the danger of an additional irritation of an already overloaded kidney.

ADDENDUM.—Since writing the above, which constitutes the Boylston Prize Essay, other experiments have been undertaken which have a direct bearing upon the production of nephritis, and it is thought advisable to insert them here as still further elucidating the subject. In these, serum obtained from the blood of a young man, healthy so far as the kidneys were concerned, was used. The man, aged twenty-two years, was in the Presbyterian Hospital with lumbago. He had had no illness which could have produced a consequent lesion of the kidneys; his urine throughout his stay in the hospital was uniformly normal; nor was there anything in his symptoms or condition which would lead to a suspicion of nephritis. He was bled after his complete recovery from the lumbago. This serum, when injected into dogs, produced no symptoms whatever; but upon killing the dogs lesions of the kidneys were found analogous with those in kidneys where injection of serum from nephritis was practised. The lesions, however, noticed so uniformly throughout the latter, were, where healthy serum was used, not so evenly distributed; in places the kidneys were practically normal, in others slightly degenerated. Nor was the degeneration nearly so pronounced as after the injection of diseased serum; the process seemed to be the same, but it was not so far advanced and there was nowhere any fatty degeneration; in fact, it suggested a smaller amount of poison or one of less virulence. Figs. 7 and 8 show a section through a portion of the kidney most markedly affected.

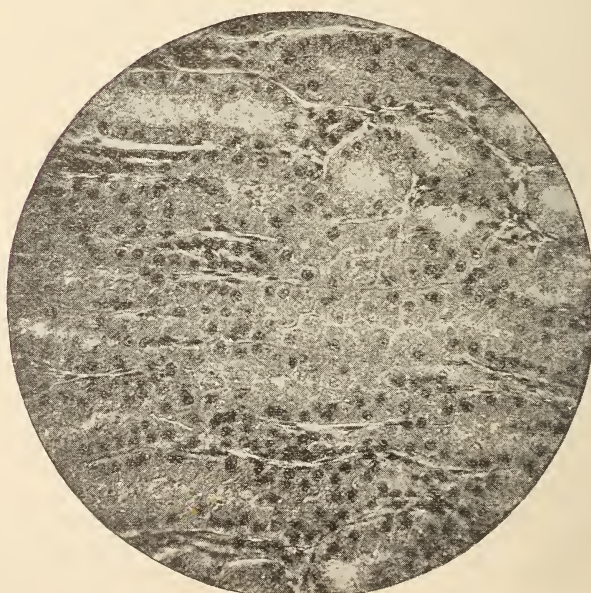
The poison here must be the same as that in the blood of nephritis, for the reason that the lesions obtained in the kidneys are identical. Having established this fact, it is evident that one of two suppositions must be correct—either this man had nephritis or there is constantly

FIG. 7.



Convoluted tubules of kidney of dog injected with blood serum of healthy young man, showing granular appearance of cells.

FIG. 8.



Collecting tubule of same kidney.

present in normal blood a substance which, in sufficient quantities, is capable of producing nephritis. It is scarcely possible that the man's kidneys could have been diseased; great care was taken to exclude this by careful examinations of his urine and by a thorough canvass of his condition and previous diseases; so we are forced to adopt the second supposition, that the nephritis-producing substance is constantly present.

This same serum injected into rabbits produced in their kidneys a degeneration of the same character as that just described in dogs, but very decidedly more violent; the process was quite uniformly distributed and had advanced much farther. The serum of healthy dogs injected into a rabbit produced again the same degeneration, but here less violent than where human serum was used. On the other hand, serum from horses produced no effect upon the kidneys of rabbits.

We have, then, as the result of these experiments the following facts:

1. Healthy human serum will produce in the kidneys of dogs a moderate degeneration and in those of rabbits a degeneration much more violent.

2. Dog's serum will produce in rabbits a degeneration of a moderate degree of intensity.

3. Horse's serum has no effect upon the kidneys of rabbits.

From these facts it is evident that the order in which serums stand as to their toxicity, and so the amounts of toxic substance which they contain, is: human, dog, horse.

This would suggest still further that the origin of this substance is probably to be traced to the character of the food, and that its production takes place somewhere in the digestive system. For the largest amount of poison is found in man, with his meat-ingestion and complex, easily disarranged digestion; next in dogs, with their semi-carnivorous diet; and least in the horse, a pure herbivore. Clinically, it has been well established that cases of Bright's disease improve when meats and kindred substances have been removed from the food, and do best of all upon that simplest of diets, milk. Experimentally it has been shown that the urine of animals is rendered least toxic by a milk diet. These facts would all point in one direction—they refer us to the digestive tract for the origin of the poison.

ON THE PATHOLOGY OF ARTERIO-SCLEROSIS.

BY F. PARKES WEBER, M.A., M.D., M.R.C.P. (LOND.).

ARTERIO-SCLEROSIS was first described by Sir William Gull and Dr. Sutton in 1872. In their paper before the Medical and Chirurgical Society of London,¹ they suggested the name of arterio-capillary fibrosis for the morbid change they described.

The term arterio-sclerosis is merely a Greek rendering of Gull and Sutton's term, but has perhaps the advantage of a more international character.

The essential change, according to Gull and Sutton, was a thickening of the walls of the arterioles and capillaries, more or less in all parts of the body, and more recent observations have not made much advance on this. The hyaline appearance of the fibroid change, as described by Gull and Sutton, was shown to be due to the acidulated glycerin in which their microscopical specimens² were prepared. It is also true that in the arterioles Gull and Sutton considered the change to be situated chiefly in the tunica externa, whereas most recent observers have considered the primary change to be rather an accumulation of cells in the interna.

This latter view appears to me not proven and the difference not a matter of the greatest importance. Upholders of the latter view have maintained that the essential change in arterio-sclerosis may be termed an endarteritis obliterans affecting the smaller arterioles. To this term I should prefer the original one of Carl Friedländer, namely, arteritis, or arteritis obliterans.³ It may certainly not always be easy to see whether a process (even when certainly inflammatory) is primary in the tunica externa or interna, for, as Friedländer points out, cell accumulation in the one is often accompanied by a corresponding process in the other. A double process like this may be the method by which vessels are sometimes obliterated in a tuberculous lung-area, the perivascular irritation giving rise to a sort of endarteritis obliterans; so also at the base of the brain, perhaps a perivascular⁴ syphilitic process may sometimes be the cause of an endarteritis obliterans. At any rate, as regards

¹ Transactions of Medico-Chirurgical Society, vol. lv., 1872, p. 273 et seq. Dr. Walshe had in 1849 endeavored to show that "Bright's disease" was of constitutional origin (see *Lancet*, 1849, vol. ii., p. 29: "Bright's Disease Not Essentially a Renal Disease, but Essentially and Primarily a Blood Disease."). He went, however, in a direction quite different to "arterio-sclerosis," and concluded that "Bright's disease" is a blood disease, *ab initio*, essentially tending to chronicity, though (like cancer and phthisis) sometimes running an acute course.

² Fagge's Principles and Practice of Medicine, third edition, vol. ii., p. 464.

³ Dr. Carl Friedländer, "Ueber Arteritis Obliterans," in the *Centralbl. für med. Wissenschaft*, January 22, 1876. In this paper of Friedländer the process is discussed with no special reference to Bright's disease.

⁴ But either of these processes may also give rise to miliary aneurisms.

arterio-sclerosis, it may still be considered doubtful whether the process begins in the tunica externa or interna, and therefore, as far as arterio-sclerosis is concerned, the term arteritis obliterans seems better than endarteritis obliterans.

There is, however, another objection to either of the terms endarteritis or arteritis obliterans being spoken of as the primary lesion of arterio-sclerosis; this is that the termination "itis" implies that the process is necessarily one of inflammation. For although undoubtedly the two are very frequently associated, it remains doubtful whether inflammation is a *necessary* factor in arterio-sclerosis. As regards this point I have been obliged to look for a modern definition of inflammation. The "rubor, tumor, calor, et dolor" of Celsus can no longer be considered satisfactory except from a purely clinical point of view, in which case it is certainly convenient. The "functio læsa" may be a more constant accompaniment of inflammation, but does not help us in the present case. For the present purpose it is perhaps sufficient to regard inflammation¹ as the series of tissue changes caused by an injury or by the presence of some harmful irritant, and usually leading to an accumulation of cells in the part affected.

This includes the cell accumulation resulting from proliferation of the fixed cells as well as that resulting from the migration of leucocytes. Such a modification of modern definitions of inflammation includes tuberculous affections, and will include cancer and sarcoma if ultimately the presence of coccidia should be proved to be necessary to their development. The presence of necrobiosis, secondary to inflammation or due to the same original cause, will not confound the definition. If then we accept such a definition, does arterio-sclerosis fall under the head of inflammation?

The cell accumulation is certainly present, but the irritant cause is what I consider not proven. It is better to speak of the essential change which the microscope discloses in arterio-sclerosis as a thickening of the external and internal coats of the arterioles, and not to apply to it any particular name implying the presence of inflammation.

This naturally brings one to the *etiology* of arterio-sclerosis. Gull and Sutton left this a doubtful point, and a doubtful point it remains in common with the etiology of many other chronic diseases. All that can be supported by fact is that arterio-sclerosis has some relation to age, syphilis, arthritis, and the uric acid diathesis (if the latter be not included under arthritism); probably only through the diathesis is there any relation with actual uricæmia; furthermore, it must be allowed that an hereditary tendency to arterio-sclerosis, allied to inherited arthritism, may exist.

¹ Compare the definition used by Prof. Burdon-Sanderson in the "Lumleian Lectures on Inflammation," 1882.

How uncertain are the alleged causes of arterio-sclerosis may be gathered from the fact that of two well-known French writers, Huchard¹ includes alcohol, tobacco, saturnism, inheritance, acute and chronic diseases, such as typhoid, smallpox, syphilis, malaria, etc.; whereas Lancereau maintains that arterio-sclerosis always owes its origin to nervous causes. It will be here impossible to do more than allude briefly to the most important of the alleged causes, but in examining them one is struck by the uncertain nature of their claims. Sir George Johnson² considered that the kidney disease is primary, that in consequence of this the blood contains urinary excreta, and is otherwise altered, that the minute arteries throughout the body resist the passage of this abnormal blood, and in consequence of this the muscular walls of the arteries and left ventricle become hypertrophied, as seen at autopsies. Johnson's theory was combated by Gull and Sutton; they pointed out that the vascular changes could precede the kidney disease, or, as Bamberger has stated, appear in its earlier stages; moreover, they stated that extreme degeneration of the kidneys (either large white or contracted³) may be accompanied by œdema and uræmic symptoms, which indicate doubtless a noxious state of the blood, and yet the characteristic cardio-vascular changes may be absent. Neither does it appear proved that the high-pressure pulse of arterio-sclerosis is due usually to an abnormal contraction of the arterioles, though doubtless this may occasionally occur. If it were so, one would expect to find the muscular coat of the arterioles hypertrophied, as Sir George Johnson described them to be; but, according to most observers, when this thickening exists it is due to increase of fibrous tissue. Certainly in some cases of chronic Bright's disease the arterial tension can be lowered by nitrite of amyl,⁴ but this does not affect the point, because arterio-sclerosis, although a generalized disease, by no means affects all parts of the body equally. The mechanical arterio-capillary fibrosis may be the cause of increased arterial pressure, and yet the arterioles over large areas of the body may still be insufficiently affected to prevent them from dilating under nitrite of amyl, and thereby a fall in the general arterial pressure would ensue on the administration of nitrite of amyl.

Let us now consider some other alleged causes of arterio-sclerosis—

¹ *Maladies du Cœur*, 2d ed., Paris, 1893, pp. 119 et seq.

² See *Brit. Med. Journal*, April 16, 1870.

³ *Med.-Chir. Trans.*, vol. lv. p. 294. So also it has been stated that chronic interstitial nephritis can be caused through obstruction to the ureters by uterine cancer, without any hypertrophy of the heart resulting. On the other hand, it is stated that high arterial pressure and hypertrophy of the heart may follow hydro-nephrosis, say from impacted calculus, in a few weeks. (See *Brit. Med. Journal*, November 4, 1893, p. 998.) Gull and Sutton referred to cases of contracted kidneys in young subjects, not over twenty years of age, and believed that such cases were of quite a different nature to ordinary cases of contracted kidney.

⁴ *Vide* Fagge, *op. cit.*, 3d ed., vol. ii. p. 467.

namely, acute and chronic infectious diseases. Of these I will confine myself to syphilis, as it is the most often adduced.

Certainly many patients with marked arterio-sclerosis and chronic interstitial nephritis have had syphilis, but the question is whether the proportion in arterio-sclerosis exceeds that in other diseases; moreover, how many patients have had syphilis and even tertiary manifestations, and yet do not suffer especially from arterio-sclerosis! It seems curious that syphilis, which has such characteristic tertiary lesions of its own, should also have been represented as playing so great a rôle in the etiology of many chronic diseases, which certainly are not exclusively¹ dependent on it. I need only mention "arterio-sclerosis," "tabes dorsalis," and "general paralysis of the insane." With reference to the frequent antecedence of syphilis in these diseases, one must remember, first, the great frequency of syphilis as a disease, and, secondly, the cases are to be considered where true syphilis may simulate one of these diseases. Thus, a spurious general paralysis has been described, which is due to actual syphilis, and is really benefited by antisiphilitic treatment; Charcot points out that true syphilis may simulate the symptoms of tabes dorsalis; in like manner true syphilitic lesions may cause (by occlusion of vessels or rupture of miliary aneurisms of syphilitic origin) brain symptoms which are frequent in arterio-sclerosis.

In short, the claims of syphilis do not appear quite established as regards the etiology of arterio-sclerosis.

There certainly are some remarkable cases which appear to support the view that syphilis may give rise to arterio-sclerosis. Such a case is that narrated by A. Fraenkel at the Berlin Medical Society (*Berliner klin. Wochenschrift*, 1894, No. 12).

The patient was a woman, aged thirty-six, who died in an attack of angina pectoris. At the necropsy on this case the right coronary artery was found to be obliterated at its orifice by a process resembling arterio-sclerosis, and to confirm the view that this apparent arterio-sclerosis was really due to syphilis, a gumma was found in the septum ventriculorum. Might not, however, in this case and in similar cases, the stenosis of the artery be due to an actual tertiary syphilitic process, and, though closely resembling a process of precocious arterio-sclerosis, be really caused by the irritation of the specific poison or microbe of syphilis, if such a specific microbe or poison be admitted as the cause of tertiary syphilitic lesions? If, then, the claim of syphilis still appears doubtful, the claim of other infectious diseases to be regarded as causes of arterio-sclerosis appears more doubtful.

Other alleged causes are the continued presence of abnormal sub-

¹ Unless, in the case of tabes, we accept the view of those who make syphilis a *necessary* antecedent of tabes dorsalis.

stances in the blood or tissues, due to indulgence in alcoholic drinks, tobacco-smoking, saturnism, or uricæmia. Statistics have not yet settled these questions.

If we suppose that these substances cause arterio-sclerosis by inducing spasm of the arterioles we admit that the high arterial pressure is the cause and not the effect of arterio-sclerosis; but, as I have just pointed out, the increased arterial pressure may be the effect and not the cause. If, on the other hand, we suppose that these substances act by setting up a chronic inflammation in the walls of the arterioles, we admit that the essential lesion in arterio-sclerosis is one of chronic inflammation, and I pointed out (when speaking of endarteritis obliterans) that this assumption is not justified. That chronic lead-poisoning may induce a chronic interstitial nephritis is admitted; but some observers deny that in these cases the cardio-vascular changes of arterio-sclerosis¹ are a necessary accompaniment. As regards uricæmia it seems more probable that any relation which arterio-sclerosis may have with it is rather a relation with the diathesis than with the actual excess of uric acid in the blood.

This brings us to the most important group of alleged causes of arterio-sclerosis, namely, inheritance, age, and the arthritic and uric-acid diatheses. Rather than adduce old age as a cause, its relation is, perhaps, better put by stating merely that arterio-sclerosis is a disease of the second half of life, and very rarely attacks those younger. The arthritic and uric-acid diatheses are probably also rather associated conditions than standing to arterio sclerosis in any direct relation of cause and effect.

One fact seems certain, namely, that there is often an hereditary tendency to arterio-sclerosis, and this is especially the case where there is an "arthritic" family history.

One might suppose, indeed, as has been suggested to me, that in families which possess sufficient vitality and energy to adapt themselves to their surroundings, and which in consequence survive for many generations, there may, side by side with the resistance to tuberculosis and other diseases² which exterminate families who are physically too weak to adapt themselves to their surroundings; side by side with this resistance there may grow up a tendency to gout, arterio-sclerosis, and "degenerative" diseases, which may themselves, if unchecked, lead to the ultimate extinction of the family. This view does not, however, bring one to an end of the difficulties, and even in the hereditary cases of arterio-sclerosis alternatives present themselves; the hereditary ten-

¹ If, however, any influence of lead in the production of arterio-sclerosis be granted, it can still be maintained that this action is brought about through the medium of the nervous system, on which the action of lead is so well known.

² See the Milroy Lectures, by Dr. J. Berry Haycraft, in the *Lancet*, 1894, vol. i. Nos. 7-9

dency may be a tendency to a primary dystrophic process in the arterioles, or, as Lancereaux maintains, the faulty inheritance may lie entirely in the nervous system, the nutrition of the tissues being only indirectly affected. In like manner a nervous origin for gout and rheumatoid arthritis is being seriously entertained, and it would indeed simplify matters if we could rest here; but a history of mental strain and overwork, or rather, as Sir Dyce Duckworth would say, "irregular work," is certainly not necessarily present in cases of arterio-sclerosis, nor are the symptoms of any nerve trouble necessarily present.

If it be permissible to venture a somewhat vague suggestion as to what is one of the most probable causes of arterio-sclerosis, it is that what may be termed "excess" in its sometimes necessary and often long-continued forms seems, in the present state of our knowledge, to have the greatest share in the production of arterio-sclerosis. By such "excess" I mean merely a "strained" manner of living, which can by no means always be associated with any expression of reproach. It may be excess in physical labor; it may be excess and irregularity in mental work, including anxiety and worry; it may be the habitual taking of too much or too little food, from over-indulgence or insufficient means, both of which are so often accompanied by mental worry and anxiety. Such agents—or, rather, combinations of them—seem to be likely factors in the production of arterio-sclerosis; they can act on a single individual or cumulatively, through several generations, on a family.

On the whole, however, although such hypotheses appear very tempting, it must be admitted that the etiology of arterio-sclerosis remains as yet uncertain; but the condition must still be regarded as a primary one in pathology, though in some way allied to some of its alleged causes.

THE THERAPEUTICS OF INFECTIOUS PROCESSES IN THE NERVOUS SYSTEM.¹

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A CONSIDERATION of the treatment of infectious nervous processes involves not only the treatment after infection has occurred but also its prevention. The latter is not the least important part of our subject, and to it we will first give our attention.

¹ Third paper in the discussion on "The Influence of Infectious Processes on the Nervous System," before the General Session of the Congress of American Physicians and Surgeons, June 1, 1894.

From much that we know we have reason to believe that the occurrence of infection is markedly influenced by the nervous system. Charrin and Ruffer, in experiments on animals, discovered that section of the sciatic nerve under certain conditions favored pyocyanic infection. Roger cut the sympathetic nerve in the neck, and saw erysipelas which he had inoculated into the ear of the same side disappear, while on the other side it continued to develop. In another instance, instead of the sympathetic this investigator cut the auriculo-temporal nerve, when the reverse result was observed, for the streptococcus developed more readily on the side of the section. Not only did he prove that the nerves influence the process, but that different sections produced different results. Startling as are these facts, they are, after all, in harmony with what we know of the control which the nervous system exercises over all of the functions of the economy. Not only does it dominate digestion, circulation, and nutrition in general, but also absorption. The vasomotor nerves, through their influence on the size of the vessels and probably on the size of the stomata of the capillaries, are a powerful factor in determining the result. It is probable that the destructive inroads of germs are at times favored and at other times delayed or prevented by their action. Thus when the vessels are constricted and small it is probable that invasion can take place with little or no interference on the part of the organism. On the other hand, if the vessels be in their normal condition or perhaps a little dilated, it is probable that the white blood-corpuscles pass out into the surrounding tissue and act as phagocytes upon the invading germs, and that, in addition, the liquid constituents of the blood exert an action both bactericidal and antitoxic.

If the rôle of the nervous system is so important, if the ingress of microbes is to so great an extent under nervous control, prophylaxis assumes an importance altogether peculiar. It becomes at once evident that our ability to resist infection depends largely upon the maintenance of a normal nervous tone—*i. e.*, nervous health. Indeed, we may here find a partial explanation of the difference of susceptibility displayed by persons exposed to infection under similar circumstances. That these thoughts are not mere speculative fancies is proven by such experiments as those of Charrin and Roger on the rôle which fatigue plays on the evolution of infection. These experimenters constructed an apparatus, on the principle of the squirrel-wheel, by means of which they brought about marked muscular fatigue in animals. They conclusively proved that this fatigue distinctly favored the development of infection. Thus, in one series of their experiments they used thirty-six rats; of these they reserved fifteen as control animals. Twenty-one they inoculated with the germs of charbon, and then by means of their apparatus caused them to walk for from two to eight hours daily for three days in succession. It was found that the resistance of the animals

to inoculation varied according to age and size. In each series of experiments the investigators were careful to employ specimens of nearly equal size, taking care to preserve one, if any the smallest, as a control animal. All were inoculated into the skin of the flank. Three of the control animals withstood perfectly nine drops of the virus. The same dose was administered to eight others who were then subjected to the fatigue test. One of these resisted the inoculation fully, a second died at the end of four days, four at the end of three days, and two on the day after the inoculation. By increasing the dose, the experimenters were able to kill one of the control animals, but the latter did not die until at the end of five days. Further studies made by them yielded the same results, and in every instance, both by microscope and cultures, they verified the cause of death. The bacteria were always discovered in the blood. By their experiments they were also led to believe that fatigue favors infection from the intestinal tract. The conclusions to be derived from these researches are so clear as to be self-evident.

We have learned from the investigations of Hodge that nerve cells undergo certain changes in the course of their functional activity and that these changes can only be interpreted as those of fatigue. When analyzed they resolve themselves into simple loss of substance. That there may be in addition other changes less tangible—changes which are attended by the formation of products the result of retrograde metamorphosis—is also probable. However, the simple story of the tissue waste teaches us a fact of great significance, for loss of substance being synonymous with fatigue, it must also be taken as synonymous with weakness, and, in virtue of the rôle that the nervous system seems to play in infection, this weakness must be construed as synonymous with a diminished power of resistance to the invasion of germs. The first problem, therefore, that presents itself is the prevention, if I may be permitted to so state it, of undue waste of nervous substance through undue or excessive fatigue. To repeat what is known to every physician, that long-continued overwork, with insufficient rest and food, favor the development of various diseases, may seem unnecessary here, but that we are now in a position to frame an intelligent hypothesis based upon the experiments of Hodge, Charrin, and Roger, and others, is certainly interesting and important. The value or rather the absolute necessity of a proper proportion of sleep and a proper amount of food follow as unavoidable corollaries, but another element must also be considered. It not only suffices that the nerve cell should have rest and that sufficient pabulum for its regeneration should be at hand, but, to repeat what is universally known, exercise both mental and physical within physiological limits is absolutely necessary. The solution, therefore, of the question of a proper prophylaxis is answered thus far by a proper proportion of food, rest,

and exercise. The nervous health is, of course, influenced by numerous other factors concerned in general hygiene and special etiology; but these, I take it, do not directly concern us here. Simple as the conclusions with regard to general prophylaxis appear, their value must not be underestimated. To realize that overwork leads not only to nervous exhaustion, a fact with which the laity are as familiar as ourselves, but that it also opens the avenues of infection, is one which should be appreciated in its broadest significance.

The question next arises: "Are there any means of *special* prophylaxis against this or that infectious nervous disease?" Here, unfortunately, the answer which we can give is hesitating and clouded with uncertainty. At once the preventive inoculations of Pasteur, Behring, and Tizzoni and Cattani, suggest themselves, but at the same instant doubts as to the advisability and applicability of the methods arise. Roughly speaking, the question of preventive inoculation for infectious nervous diseases must be answered, as we shall see farther on, in the negative. However, special prophylaxis appeals to us from another quarter. Supposing that the general economy is already the subject of bacterial infection, are there no means by which the spread of the infection to the nervous system can be averted or the chances for such infection diminished? Is there anything that can be done in the various infectious fevers, in general pyæmia, in suppurative otitis media, in lung abscess, empyema, etc., to prevent nervous involvement? Are there any means by which the meningitis, brain abscess, and neuritis, that every now and then make their appearance in the course of these diseases, can be prevented or the chances of their occurrence lessened? With regard to abscess, the question may often be answered in the affirmative, but at times the involvement of membranes, centres, or nerves is to be explained either by the excessive virulence of the infection or by the special susceptibility of the nervous system to the poison in question. At times, too, secondary involvement of the nervous system is to be regarded as related to the sudden suppression of some local symptom, as a purulent discharge or perhaps an eruption.

Where the nervous system is threatened by the existence in other structures of foci of infection, abscesses, and suppurating cavities, such as purulent otitis, mastoid disease, purulent inflammation of the frontal sinuses or of the orbit, lung abscesses, empyema, the indications as to prophylaxis are very clear. A suppurating cavity, be it large or be it small, constitutes a perpetual danger, and the importance of securing free evacuation and free drainage, wherever such a cavity is situated, need not here be dwelt upon.

Practically, we must admit, questions of general and special prophylaxis are presented to the physician far less frequently than questions of treatment after infection has actually occurred. Here the problem

again resolves itself into general and special methods. The general indications are of course clear. They are: first, to arrest or limit the infective process; and, secondly, to bring about a rapid elimination of morbid products, toxins, etc., or the evacuation of tissue detritus, such as we find in purulent inflammations, abscesses, and the like. The first indication, namely, to arrest the infective process, is easier proposed than carried out. Unhappily we are not yet possessed of a germicide which will enable us to bring about the death of germs within the nervous system without injury to the tissues. Such a substance would be one that would act upon microbes as quinine appears to act upon the organisms of Laveran. It is in this field that chemistry and the biological laboratory may some day yield us a great discovery.

In the meantime Pasteur, Koch, Behring, Kitasato, Tizzoni and Cattani, and others have attempted the solution of the problem on an entirely different basis. The familiar fact that the growth and multiplication of the torula is arrested by the very alcohol to which it gives rise, seems first to have suggested the attempt to combat the infectious microbes by the toxins which they themselves produce. However, with the possible exceptions of tuberculosis and leprosy, the symptoms produced by infectious micro-organisms appear to be due not so much to the germs as to these very toxins. Notwithstanding, these attempts have led to very interesting and in some instances very valuable results, and these we will briefly review.

As regards tuberculosis the story of the hopes and failures of Koch's lymph is too recent to bear repetition. In tuberculosis of the nervous system the lymph is shown to be not only useless but even dangerous. This is the experience of Brehm and others in tuberculous meningitis, and even if it be given for tuberculosis of other structures tuberculous meningitis may arise during its use. Caspersohn, for instance, observed such meningitis develop while he was treating his patient for tuberculous fistula and abscess of the right thigh and hip.

In the treatment of leprosy by the lymph, failure appears to have been almost equally marked. The writer has collected in all sixty-four cases treated by Koch's lymph in 1891. Not a single cure was reported among them all. Poupinel noted considerable improvement in two cases out of five. Kaliendero and Babès noted amelioration and improvement of general condition in eleven. Schwartz noted improvement in a number out of twenty-two cases, but did not follow them up. Goldschmidt noted improvement in one out of ten. It appears that even these general statements of amelioration and improvement must be taken with considerable allowance. Danielssen, after having treated fourteen cases, comes to the following conclusions: First, that there is a local and constitutional reaction which comes on from four hours to three days after the injection of the lymph. The local reaction occurs

later. Second, that the reaction has no favorable influence upon the leprous trouble, but on the contrary it aggravates the latter. Third, that the tuberculin does not destroy the lepra bacillus, but that it fertilizes the soil for the latter, the bacilli increasing in activity and destructive qualities more than if the patient had received no treatment. Finally he concludes that the method can produce a kind of immunity when the tuberculin is used for a long time, but that the method does not arrest the progress of the disease, for new symptoms may develop under its use. Whether modifications of the lymph or such methods of preparation will yet be devised as will eliminate all elements of danger, and whether it will finally be successful, can of course only be conjectured.

When we turn our attention to Pasteur's efforts with hydrophobia the story is decidedly more encouraging. It is obviously out of place here, nor would time permit us, to go into a detailed discussion of Pasteur's methods, nor to consider in detail the claims and criticisms of his practical results. However, a brief review of his methods is necessary for our purpose. As is well known, Pasteur found that if the spinal cords of rabbits inoculated with rabies are kept in a room with a constant temperature of 20° C. (68° F.), they gradually lose their virulence with each day's action of the dry atmosphere and the surrounding temperature until, after the expiration of fourteen days, a material remains which produces no perceptible action upon rabbits or dogs when introduced into the brain. It does, however, protect the animal against future inoculations with most active forms of the virus. It appears that the process of drying destroys the germ (whatever that may be), but leaves the toxine produced by the germ practically unchanged. Pasteur obtained his virus by inoculating rabbits beneath the dura mater with the spinal cord of the rabid dog. Then, this rabbit having developed rabies, its spinal cord is inoculated into a second rabbit, and this process is repeated until finally it is found that the virulence has increased to such an extent that a small particle of the cord injected into a rabbit will kill in seven days. The spinal cord of the last animal is then attenuated in dry air as described above. A small fragment of this material is then diluted in sterilized bouillon. These injections are repeated with material obtained from cords of greater virulence until finally a very virulent material is injected, when the animal is found to be immune. Pasteur applied his method to the treatment of patients suffering from the bites of rabid animals, by beginning with material obtained from cords that had been dried for a period of fourteen days and by steadily following the initial injection with material obtained from cords of less attenuation until at last the cord of one day's drying was used. The injections were made under the skin. The theory of Pasteur is that a gradual accommodation of the organism to the virus occurs.

As is well known, Pasteur's claims were confirmed by the English Committee of Investigation. This committee reported that the experiments of Mr. Horsley entirely confirmed Pasteur's discovery of a method by which animals may be entirely protected from the infection of rabies; and further, that the personal investigation of Pasteur's cases by members of the committee was, so far as it went, entirely satisfactory, and convinced them of the perfect accuracy of his records. Among those who have also given attention to the question of hydrophobia experimentally must be mentioned Tizzoni and Cattani. These investigators experimented with the vaccine extracted from the central nervous system of rabbits dying from fixed virus, though even a vaccine prepared from the first generation after inoculation gave positive results. Ten cubic centimetres of their liquid contains dissolved the active principle of about one gramme of rabic nervous system. This solution failed absolutely to produce rabies by experimentation, and was entirely aseptic. With this liquid they succeeded in making twelve out of fourteen rabbits entirely immune. In the two in which preventive inoculation had been unsuccessful the quantity administered seemed to have been insufficient. Tizzoni and Cattani concluded that one inoculation is sufficient, and that even on the following day the animal may be inoculated with rabic virus without developing the disease. They further proved that their vaccine was efficacious even when administered during the incubation period of rabies, though a larger dose is in such a case necessary. They concluded, however, that in the case of rabbits the treatment must not begin later than four days after the infection.

More recently Tizzoni and Cattani made the interesting discovery that in sheep and dogs which had been injected under the *dura mater* with rabic nervous system the serum acquired an anti-rabic value. This anti-rabic quality increases in intensity until the twenty-fifth day after vaccination—that is, subdural inoculation—and then begins to decrease. This is the time when the serum should be removed from the animal. The serum, they claim, produces no unpleasant effects whatever and is absolutely lacking in virulence. These interesting and original observations are in harmony with those made previously by them regarding the immunizing and therapeutic effects of the serum of rabbits that had been rendered immune by vaccination with the rabic virus. The scientific importance and wide significance of these discoveries cannot be overestimated.

The story of the extensive application of Pasteur's methods, his extravagant claims as to results, together with the active opposition they aroused in certain quarters, is still too recent to bear repetition. In Paris itself his claims, as is well known, have been actively combated by Lutaud, who showed that in France over a period of twenty-three years (1850 to 1872) there were but 685 deaths from rabies—that is,

about 30 a year. Pasteur claims that during the five years 1881 to 1885, there were 60 deaths in the hospitals of Paris. This is disputed by Lutaud, who cites cases with the hospitals at which they were treated, showing only 26 deaths. Again, Pasteur claims that the annual mortality for seven years up to 1870 is 76; Lutaud proves it to be 47.7. Vulpian states, in Pasteur's name, that the number of persons bitten by rabid dogs in one year was 100 and the number of deaths 16, and that these occurred in persons not treated by the Pasteur method. He then follows this statement by saying that out of the 1726 cases treated only 12 died in place of the 276 who would otherwise have died without treatment. Lutaud called attention to the remarkable increase of the number of cases of rabies implied by these statistics. Pasteur says that of 1929 Frenchmen treated 18 died up to December 31, 1886; all told there were 2682 cases of hydrophobia. Lutaud then shows that the cases of death in the Pasteur Institute during the year 1886 numbered 22, and further that there were also 17 deaths without treatment, making a total of 39 deaths for the year 1886, which is an excess over the mean annual mortality of previous years, which was 30. From 1886 to 1890 there were 90 deaths after Pasteur's treatment had been employed. The cases, names, addresses, etc., are recorded. If we add to this the number of deaths of those not treated, we have the figures 154, a mean of 38 deaths a year.

Among the opponents of Pasteur's methods must also be mentioned Dulles, whose criticisms have been exceptionally severe, as the following citation from a paper read before the recent meeting of the State Medical Society of Pennsylvania will show:

"The number of cases of hydrophobia that occur in this country is happily small. It would doubtless be smaller still but for the exploitation of the Pasteur Institute conducted by Gibier in New York, and of its feeble imitator conducted by Lagorio in Chicago. These institutions and the newspapers that, in times past, have published sensational accounts of cases of so-called hydrophobia, have in a mild way reproduced some of the conditions which make France the hotbed of hydrophobia as well as of hystero-epilepsy. But the psychological make-up of Americans is less favorable to the development of the germs of hydrophobia or those of hystero-epilepsy than is that of the French, and consequently there is less of either here than there is in France. There the history of the last six years differs but little from that which I described to you in my last report. As then, so now, the number of deaths in France is greater than it was before Pasteur, just ten years ago (in May, 1884), boasted to a newspaper reporter: 'Whoever gets bitten by a mad dog has only to submit to my three little inoculations, and he need not have the slightest fear of hydrophobia.' The year before he made that boast there were 4 deaths from hydrophobia in Paris (the department of the Seine); the year after, when he had practised his preventive method for six months, the deaths from hydrophobia leaped at once from 4 to 22. In 1886 the number fell to 3 again in Paris; but I have a list of 23 persons that died after treatment by Pasteur himself in that year. In 1887 the deaths in Paris rose to 9, in 1888 to 19. These oscillations indicate that Pasteur's method is no more preventive of hydrophobia than is the method which he declared, in 1884, would eradicate rabies in dogs. On the contrary, Pasteur's method

has undoubtedly increased the number of deaths from hydrophobia. I have indicated what has taken place in France and can assure you that there has been no diminution of the number of deaths from hydrophobia in any part of the world since Pasteur's infallible cures were inaugurated; and at the same time there has been added to these a large number of deaths due to inoculations with virus of what ought to be called 'Pasteur's disease.' Just how many these have been, no man can say. The statistics in regard to these deaths are confusing. Those from friendly sources contain remarkable discrepancies. Pasteur's own statistics, published in the *Annales de l'Institut Pasteur* for March of this year, admit 72 deaths in seven and one-half years after treatment in Paris. My own statistics show a much larger number, while I find that Dujardin-Beaumetz, an enthusiastic supporter of Pasteur, reported to the Académie de Médecine on June 21, 1892, 98 cases in only six years, which is just 26 cases more than Pasteur himself reported for eight years. One way in which such curious figures appear may be seen when we examine Pasteur's detailed report for 1893, when we find that 10 actual deaths are set down as 4, because 2 of the 10 unfortunates succumbed in less than fifteen days, 3 developed their fatal disease while receiving the inoculations, and only 1 did not stay to have the treatment completed. The same manipulation may be found in the reports for other years."

In the limited time at our disposal a detailed review of the evidence pro and con of Pasteurism and hydrophobia is impossible. However, it is vain to deny the truth of Pasteur's experimental researches upon animals, while the evidence as regards human beings is in *specific* instances strong and convincing. It goes without saying that of the number of dogs who inflict bites upon human beings a percentage only are rabid, and finally, that of the number of persons bitten by rabid dogs only a portion become infected with the disease. The publication of Pasteur's methods, the wide distribution among the laity of information concerning his treatment, and the well-known predisposition of the French to hysteria, have increased enormously the number of persons who have directed medical attention to bites received by them, and in this way is doubtless to be explained the enormous increase in the number of cases.

However, in a disease the mortality of which untreated is practically 100 per cent., any method of treatment that yields even a ray of hope deserves trial. Inasmuch as the period of incubation is generally prolonged, there is certainly time for giving a patient the benefit of Pasteur's method. It would seem that the rational course in a given case would be to remove the spinal cord of the supposed rabid dog, and to perform with it test inoculations upon rabbits, and having determined the actual existence of rabies by this means, to rapidly prepare attenuated material. The evidence shows that the risk involved by the injection of such material is exceedingly small. Let us hope that the discovery of Tizzoni and Cattani, of the anti-rabic value of the serum of dogs and sheep upon which subdural inoculations have been practised, will lead to a simpler and more direct method.

When we turn our attention to the subject of tetanus we find the existing state of investigation to be more interesting still. In 1890,

Kitasato attempted to make animals immune to this disease. His attempts by means of repeated inoculations of attenuated virus failed to yield a satisfactory result. However, by applying the method which Behring had devised in experiments with diphtheria, he finally succeeded. He first injected a middle-sized rabbit with 0.3 cubic centimetre of the filtrate of tetanus culture subcutaneously. Immediately afterward he injected into the same area 3 cubic centimetres of a one per cent. solution of iodine trichloride. In twenty-four hours the same dose of iodine trichloride was again administered. In forty-eight hours some symptoms of tetanus infection having appeared, the dose of iodine trichloride was again repeated, and twice thereafter; in all, five doses were administered before tetanic symptoms finally disappeared. The animal was entirely well in ten days. On the fourteenth, eighteenth, and twenty-fifth days large doses, 2 to 3 cubic centimetres, of tetanus culture were administered with negative results. Two control animals which received but a moderate dose of the culture, died in a few days. This method was successful in producing immunity in 40 per cent. of the animals experimented upon, and further, this immunity persists for two months. Experiments were further made to render other animals immune with the blood of immunized rabbits. Kitasato injected liquid blood, before coagulation, into the abdominal cavity of mice, who, with control animals, were subsequently inoculated with tetanus bacilli, and in such a dose that the control animals died in thirty-six hours; the others remained immune. The serum also revealed therapeutic properties. An animal could be infected with tetanus, and after symptoms had appeared, successful results were obtained by injecting the serum into the abdominal cavity. He further proved that when the filtrate of tetanus culture is mixed with the serum of the tetanus-immune rabbit, it fails to kill the mice, while control animals perish. Behring also experimented extensively in the same field, and found that iodine trichloride added to his carbolized tetanus culture in increasing doses, made the culture less and less virulent, and finally innocuous. Rabbits which survived injections of this mixture were able to stand more than the minimal dose necessary to kill control animals, and thus attained a certain degree of immunity which, through further inoculation with culture-fluid, became greater and greater. Behring also, and Schuetz later, demonstrated the possibility of thus immunizing horses and sheep.

More interesting than all, however, are the combined researches of Brieger, Kitasato, and Wassermann. To begin with, they noted that when they attempted to grow the tetanus bacillus in a watery infusion of thymus gland, they were only occasionally successful. They then made the remarkable observation that the tetanus bacillus, though it grew, failed utterly to develop spores. Even when they submitted the cultures to the incubator for as long a period as fourteen days, the result

did not vary. However, when these sporeless bacilli were transferred to other culture media they again developed spores. That is, the tetanus bacillus simply loses the power of spore-bearing while in the thymus infusion. These investigators then followed up this discovery by inoculating animals with cultures made in thymus infusion, with the result that they were able to produce immunity in all of the animals experimented upon. While the trichloride method yielded 40 per cent. of immunized animals with the immunity persisting for two months, the thymus method yielded immunity in 100 per cent., and at the end of four months this immunity was as marked as ever.

Behring, Frank, Kitasato, and Tizzoni and Cattani were successful in conferring immunity upon other animals by the injection of immunized serum. They all demonstrated also that this serum possessed in addition curative properties; that is, animals in which tetanus had been produced by inoculation, and which were afterward treated by injections of immunized serum, recovered, while control animals perished. Further, they all found that the dose required to bring about a cure was far greater than that necessary to bring about immunity. The practical application of these striking and brilliant results in the cure of tetanus in man, possesses an interest that is altogether peculiar. In a disease, the mortality of which is variously estimated at from 75 to 90 per cent., being second only to hydrophobia, the introduction of a really successful plan of treatment would rank as one of the greatest achievements of modern medicine.

Inasmuch as the quantity of serum which could be derived from mice and rabbits was obviously too small to be available in man, Behring experimented upon horses and sheep. Even under these circumstances it seemed at first as though the quantity of serum required would be too large to be practicable. However, it was found that the serum of the immunized animals increased in strength with time, and Behring finally succeeded in immunizing the serum of horses until it attained an immunizing value of 1 to 1,000,000 body-weight. Of this serum one gramme will be sufficient to immunize 1000 animals of 1000 grammes body-weight each, against a minimal fatal dose of tetanus culture.

According to Behring and Frank, and also Tizzoni and Cattani, the healing value of the serum is 1000 to 2000 times less than its immunizing value. Therefore a serum which has an immunizing value of 1 to 1,000,000 would have a curative value of only 1 to 1000. That is, for every kilogramme of body-weight one gramme of serum should be used. Again, in cases in which the disease has already advanced, or in which the infection has already produced severe symptoms, a still larger quantity must be employed. It was a serum of this strength that was applied by Rotter in the treatment of a case of tetanus in man. The patient was a male, twenty-five years of age, who had developed tetanus

after a wound of the hand. The first injection was not made until seven days after the appearance of trismus. 66 grammes of immunized horse-serum, containing 0.5 per cent. of carbolic acid, were injected into four places beneath the skin of the back. On the day following, his condition remained unchanged. A second injection of 50 grammes of the same serum was now administered. The seat of the injection was the left pectoral region, the needle being turned in different directions. The pain caused was slight. On the following day the patient expressed himself as feeling decidedly better. Trismus and rigidity of the back of the neck and of the legs were somewhat lessened, though not markedly so. Twitching ceased. 45 grammes of serum were now administered into the left Mohrenheim fossa. No reaction was noticed at the punctures or area of the injections. Distinct improvement was noticed on the following day in all of the symptoms. The fourth and fifth injections were then administered on successive days. The symptoms now steadily improved, though slowly. On the seventeenth day, after the last injection, the patient was dismissed from the hospital, with a slight rigidity of the left forearm, which five days later entirely disappeared.

Another interesting case reported is that of Moritz. Behring had succeeded in bringing up the immunity of the serum of a horse to so high a value that it was estimated to have an equivalence of 1 to 10,000,000—that is, 1 cubic centimetre would be equivalent to rendering immune 500,000 mice of 20 grammes each, or 143 human beings of 70 kilogrammes each, against a minimal fatal dose of the tetanus poisoning. These figures seem almost incredible.

It was such a serum that Moritz used in a boy twelve years of age. Unlike Rotter's case, the attack of tetanus did not follow a trauma. One week after the appearance of trismus 20 c.c. of an immunized serum were injected into the inner side of the left thigh, while 10 c.c. were injected into the corresponding portion of the right thigh, and 20 c.c. into Mohrenheim's fossa. The next day 30 c.c. additional were injected, while on the day following, 15 c.c. more were given—in all, 95 c.c. By this time such decided improvement had set in that the injections were discontinued. Three weeks after the beginning of the treatment the boy was able to walk, and some ten days later resumed his school.

In Italy this method of treatment has been employed in quite a number of cases, as many as twelve having been thus far reported. Tizzoni and Cattani, from their experiments, came to the conclusion that for practical purposes in man, when the strength of the serum has reached 1 to 1,000,000 it is most fit for use, and that the value of the serum depends only on the amount of the antitoxine it contains and not upon its origin—that is, not upon the particular animal from which it is derived. It would be unnecessary, therefore, in a case of urgency to wait until increasing injections had afforded a maximum intensity to the serum,

but to at once ascertain the strength of the latter and then to administer it in a proportionate dose.

These investigators also showed that the alcoholic precipitate derived from the serum is of the same value as the serum itself; though Behring maintains that the antitoxine does not exist in Tizzoni and Cattani's dry powder in its purity. Behring also estimates the value of Tizzoni's antitoxine as but 1 to 10,000. It would, therefore, have a far lower value than that of Behring's serum. Tizzoni estimates that of his serum, 70 c.c. would be the dose for a case of moderate severity in man in the beginning. At a later stage, 210 c.c. would be required. This would equal of the alcoholic precipitate 5 to 6 centigrammes in the first instance and 10 to 12 grammes in the latter.

The writer has collected in all some thirty-four cases of tetanus of various origins, treated either by the powder of Tizzoni or by the immunized serum. Of these, twenty were successful; certainly a large proportion. However, it is not improbable that in some of these cases the recovery was brought about not only by the antitoxine employed, but also by other measures, *e. g.*, amputation or early active treatment of the wound. Further, in the majority of the Italian cases the period of incubation was relatively long and the cases, as a whole, seemed of a mild type. Certainly they were neither very acute nor very severe. Rotter in his criticism of the first eight Italian cases goes so far, indeed, as to maintain that not one of them taken alone can be considered as proving the curative properties of Tizzoni's antitoxine. Finally, it is to be feared that in the long list of successful cases reported, the unsuccessful ones have been most unwisely omitted. If this suspicion be incorrect, the twelve Italian cases, notwithstanding their mild character, constitute a strong argument in favor of Tizzoni's antitoxine. A number of successful as well as unsuccessful cases have also been reported in Germany and France. Thus Roux and Vailland were successful in two cases, unsuccessful in five; Renon was unsuccessful in two; Escherich successful in one, unsuccessful in three; Range lost two; Baginsky and Kitasato lost one; Schwartz another. The unsuccessful cases appear to be as much open to criticism as the successful ones. In some the treatment was begun too late, in others an insufficient dose seems to have been administered; in others still, the serum appears to have been insufficient in intensity. In the successful cases the symptoms are never abruptly arrested but disappear slowly, the case often running a prolonged course.

Various speculations have been advanced regarding the method of action of the antitoxine. Tizzoni and Cattani, for instance, believe that the treatment does not so much affect the symptoms that are already present as that it limits the spread of the disease by immunizing or protecting the portions of the nervous system not already affected; that for

this reason it has little or no influence on the symptoms already developed. Thus they proved that when the injections of tetanus culture exceeded a certain amount, or the symptoms had widely progressed, the serum was insufficient to cure.

It is, however, extremely probable that the antitoxine possesses the property of directly destroying the tetanus poison. This is the position assumed by Behring. It is difficult to reconcile the theory of immunity with any other hypothesis. A statement of practical, even if of negative importance should be added, and that is that there exists no contra-indication to the use of the serum or of the antitoxine. Its employment appears to be in no way injurious. While the evidence regarding its actual therapeutic value is unfortunately inconclusive, it is still to be hoped that further trial will yield a decisive answer. The promise held out is so great that it not only justifies but absolutely demands this further trial. We learn from Behring that the serum can very readily be preserved by the addition of 0.5 per cent. of carbolic acid, while Tizzoni's results show that in the form of a dry powder it retains its virtues for a long time, and it is not improbable that the methods of preservation will yet be so far perfected that, like other remedies, they can be preserved for long periods and used at will.

The methods indicated by the researches of Pasteur, Koch, Behring, and Tizzoni are not apparently to be limited to the diseases we have thus far discussed, for from Behring we receive the hope that they may also be applied to the treatment of diseases due to streptococcus infection. When we contrast these methods, based as they are upon scientific investigation and deduction, even when we examine most critically the practical results, we realize that the hope they offer of a final conquest of these terrible diseases is nothing less than sublime.

The various other means at our disposal for combating infectious nervous processes resolve themselves into general remedies, drugs, and surgical procedures. It would obviously be out of place before an audience of this character to review well-established and well-recognized principles of treatment pursued in the various infectious nervous diseases, and I deem it my province here to touch simply here and there upon that which may be new. Unfortunately, little that is new can be said under any of these heads. Cold has been applied with varying success, as is well known, in meningitis, both cerebral and spinal, though one of the later writers (Brehmer) saw ill effects follow its use in children. Heat also has a comparatively limited application; Horsley proved experimentally that in hydrophobia it is worse than useless. Baths are rarely employed in infectious nervous diseases. It is not improbable that they would prove of benefit. From the remarkable results of the Brand method in typhoid fever the question arises whether the therapeutic result is due only to the falling temperature, or perhaps to some

other action of the water, and it has occurred to me that in such affections as tetanus and cerebro-spinal meningitis repeated and prolonged immersion in water of suitable temperature would be a justifiable expedient. Whether by this means the elimination of toxins would be favored, is a matter that can at present only be conjectured. It is interesting in this connection to note that T. J. Bennett, of Texas, reports a successful case of tetanus cured by frequent immersion in hot baths of from thirty to sixty minutes' duration.

When we turn our thoughts to treatment by drugs we meet little that is either encouraging or gratifying. For hydrophobia the treatment by drugs is equivalent to zero, and for tuberculosis of nervous structures their value cannot be said to be any greater. As regards tetanus, to the various drugs, bromide, chloral, morphine, and the other sedatives that are so familiar to us, a long list, self-condemnatory by very reason of its length, is constantly being added day by day. It includes such drugs as carbolic acid, eserine, strychnine, salicin, pilocarpine, aconite, antipyrine, and even the poison of the rattlesnake.

As regards leprosy, benefit is said to have followed the use of gurgun and of chaulmoogra oil used internally and externally. Chlorate of potash in almost toxic doses is said also to have been followed by good results. Euophen yielded benefit in one case and proved useless in four others. As regards chorea, which, though not demonstrably infectious, is probably so, quinine has recently been advanced by H. C. Wood as possessing unusual value. Extensive trial has, however, shown that it remains secondary in value to arsenic. Antipyrin has also its advocates, and especially is this true of exalgine, which Dana thinks has a specific influence in Sydenham's chorea.

On the whole, the literature affords little that is new on the treatment of infectious nervous diseases by drugs.

Surgical procedures enable us every now and then to accomplish definite and often brilliant results. This is especially true with regard to the evacuation of pus in positions that were formerly deemed inaccessible, *e. g.*, brain abscess, which is no longer the frightful and hopeless disease of former times. Indeed, it now constitutes, to use Macewen's words, "one of the most hopeful of all cerebral affections." It is earnestly to be wished that some surgeon will yet devise a means for the successful treatment of infectious diseases of the various membranes. Certainly, from what we know of their hopeless nature, purulent inflammations would justify even extraordinary procedures. In keeping with these thoughts, C. A. Morton tapped the arachnoid space in four cases of tuberculous meningitis and noted slight improvement in two of them, and Wallace, Ord, and Waterhouse trephined through the cerebellar fossa of a child of five years. A small quantity of fluid escaped, a drainage tube was inserted, and the child did well. In tetanus, also,

surgical interference has proved of great value in regard, of course, to the thorough antiseptic treatment of the wound, to excision, and to amputation.

In closing my part of the discussion—a part which I fear has been anything but satisfactory—I desire to make a suggestion in reference to the treatment of tetanus which may be of value. It will be remembered that Brieger, Kitasato, and Wassermann discovered that the tetanus bacillus, though it grew in thymus infusion, did not develop spores, and that animals inoculated with such cultures were made highly immune to the cultures of tetanus grown in other media. The thought suggested itself to me that if the thymus juice possesses such remarkable properties, it should be tested with a view to a possible therapeutic effect. Its administration in cases of tetanus beneath the skin could certainly do no harm, and might do good, and it might also be administered by the mouth, like the thyroid gland in myxœdema. If successful, it would prove far more valuable than the antitoxine, because so readily procurable.

FOOT-BALL AND THE PHYSIQUE OF ITS DEVOTEES, FROM THE POINT OF VIEW OF PHYSICAL TRAINING.¹

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THE object of physical training, as understood at the present day, is the normal symmetrical growth and development of the human body by means of a carefully selected system of graded and progressive exercise. The exercises may be divided into general and special, the former being applicable to classes and the latter to individuals according to their special individual needs. In the smaller colleges and schools the instructor in gymnastics superintends both forms of exercise, but in the larger ones a medical director takes charge of the special exercises, which are prescribed only after a most careful examination, such as only a well-educated physician can make. The exercises themselves are, for the most part, done in a gymnasium; certain games for children are played in the open air, as in the German system of gymnastics.

It seems to me that no two things are so often confounded as this system of regular exercises, taken in the gymnasium, and the practice of athletic sports. The drills in the gymnasium compare with athletic training about as the undergraduate course at a college compares with the post-graduate course. The management of the former is in the

¹ Read before the American Physiological Society.

hands of a responsible medical superintendent, that of the latter in the hands of an irresponsible (medically speaking) athletic committee composed mainly of ex-champions of the field. Systematized and supervised gymnasium exercise treats the body as a whole, and is perhaps less interesting to the partakers of it; athletic sports develop special parts to a high degree of perfection and are to some very attractive, but need corrective exercises to re-establish perfect symmetry of development, which is the object of systematized physical training.

History shows that the one great danger of all athletic sports is in their being carried too far, and a reaction in public opinion is the natural and inevitable result. Thus, some of our most prominent men and educators, as well as physicians of America and England, have quite recently placed their names on record as being very much against the *present tendencies* of some of our athletic sports, notably those of foot-ball.

Among the medical papers, especially, have the *Medical News* and the London *Lancet* repeatedly commented on the game of foot-ball and on the number of deaths and of serious injuries directly traceable, not, as I understand them, to the game itself, but to the evils accompanying it.

By still others it is even held that foot-ball has ceased to be a gentleman's game, and that the modern foot-ball player, playing, as some do, for gate-money and other pecuniary rewards, stands on about the level of the professional prize-fighter, acrobat, India-rubber man, and other freaks.

On the other hand, according to its enthusiasts the game of foot-ball is by far the greatest ever invented—that such things as pluck, self-reliance, self-control, temperate habits, soldierly qualities, and discipline of any kind were unknown in the world before its introduction; we are quite *ex cathedra* informed that all these good and manly qualities can be properly developed only through the medium of foot-ball.

There being a great deal of truth and a great deal more of error and of exaggeration on both sides of this controversy, the question is, How much of this war of words is based on facts and how much on mere opinion?

Medical papers, unlike other newspapers, are published for but one class of people, namely, physicians, who are the natural guardians of public health and in whose direct line of duty it seems to lie to call timely attention to any danger threatening life and limb from any direction or cause whatsoever. When, then, the London *Lancet* for 1892 reports one hundred and nine grave injuries, among which were noted three cases of concussion of the brain, twenty collar-bone fractures, twenty-nine fractures of legs, five compound fractures, six fatal abdominal

injuries, with a total number of twenty-three deaths; when, furthermore, the *Medical News* reports five cases of death as having occurred in this country in 1893, due to foot-ball, any medical man would consider these statements well authenticated, and without hesitation would put them down as facts, reasoning from the standing of these two medical papers, for any necessity for their either suppressing or enlarging the facts does not exist; it is, on the contrary, much to their interest to publish simply the naked truth.

Granted though it must be that it would have been much better and more satisfactory if the collectors of the above facts had, at the same time, counted the total number of players of England and America, and also if they had taken the trouble to furnish us with brief but concise accounts of all the circumstances surrounding at least the deaths that have occurred—in other words, if the statistics had been more carefully taken—yet, from the above-mentioned data, so far as they go, it would nevertheless follow that the game of foot-ball as played at the present time is attended by a considerable number of injuries and even by a certain number of deaths; the percentage number of the latter, however, would certainly look rather diminutive if the total number of players were actually known.

These, then, are some of the admitted facts that form the basis for argument against the game, and that are now agitating the public mind as well as the minds of college faculties.

Turning to the other side of this question, if we examine the foundations for the argument in *favor* of the game of foot-ball, the absence of solid facts becomes at once most apparent. It is positively discouraging when one realizes the large amount of writing extant upon foot-ball events and upon the game itself, and the time that the student of these matters is compelled to expend in reading these accounts—without, in the end, finding himself rewarded with one single solid substantiated fact or result, except those existing for the most part in the imagination of over-enthusiastic advocates of the game, and which are consequently neither ponderable nor measurable, but a fine and highly refracting collection of rhetorical soap-bubbles that will not stand critical examination.

It would seem, so far at least, as if the opponents of foot-ball had the advantage of the argument, and it now becomes the duty of the friends of the game who would like to see it perpetuated to produce, if possible, *facts* that are calculated to neutralize the disadvantages alleged. The foot-ball season with all its excitement being over for the time being, the opportunity for considering the arguments pro and con seems too favorable to be allowed to pass. Let us, therefore, see what are the facts that would argue in favor of the game from the point of view of physical training.

In the autumn of 1892 we determined to make some observations on the influence of foot-ball as an out-of-door exercise on the human physique, so far as that influence can be ascertained by certain anthropometric measurements, taken on the players, at certain definite intervals of time. In order to obtain a standard for a beginning, we tried to measure a few of the visiting "teams" as well as our own. We, very soon, however, were made most painfully aware of the great difficulty of our task from more than one point of view. In the first place, it was found to be an unusually difficult undertaking to attempt to induce a visiting foot-ball "team," solicitous about the result of the contemplated match game, to submit to being measured to the extent that is necessary for obtaining accurate and valuable results an hour or so before the game begins. It is simply useless to inform them that it cannot possibly hurt a man in training for foot-ball to squeeze and pull about a few manometers. In the second place, whatever was done had to be done quickly, and the danger of all quick work is that accuracy must be more or less sacrificed.

For these two reasons we deem ourselves rather fortunate in, nevertheless, succeeding in getting the measurements of five visiting "teams," the success being almost entirely due, rather to the winning and persuasive ways of some of my more diplomatic associates on the athletic committee than to my own efforts.

Inasmuch as our work in this direction is believed to possess a certain definite value not only as regards the subjects of physical training and anthropology but also as regards the present foot-ball question, the publication of some of the results seems both desirable and timely.

The points that were more especially taken notice of were the age, height, weight, lung-capacity, and "total strength" of each individual player, and the position which he occupied on the field.

Table I. is intended to give but the averages of each eleven on the different "teams" named:

TABLE I.

Names.	Age.	Height.	Weight.	Lung capacity.	Total strength.	Time of measurement.
	Yrs. mos.	Mm.	Kilo.	Litre.	Kilo.	1892
University of Pennsylvania	22	1810	80	4.604	624	Oct. 12
Princeton	20 8	1800	80.9	4.883	730.5	" 15
Lafayette	20	1760	77	4.260	642	" 22
Franklin and Marshall	22 4	1720	73	4.112	602	" 29
Rutgers	20 7	1780	77	4.833	686	Nov. 5
U. S. N. Academy	20	1780	73	5.094	730	Oct. 21
U. S. N. A. "Hustlers"	19	1760	71	4.456	617	" 21
Averages (French)	20 8	1773	76	4.557	662	} No. of observ. 77
Averages (English)	20 8	69.8 in.	167 lbs.	278 cb.in.	1456 lbs.	

The French system of weights and measures is now almost exclusively used in anthropometry, but for the convenience of the English reader the averages have been converted into the English system. The only item needing a more detailed description for an intelligent understanding of this and the succeeding tables is the "total strength." The total individual strength was included in our observations from the quite natural inference that the game under consideration is one in which the strong and hearty are much more apt to engage than those less plentifully endowed by Nature as regards the size and quality of their muscles. An account of the method of ascertaining this total strength will, therefore, be given under the head of "total strength."

It will be noticed in Table I., by the names of the teams there represented, that several of the larger universities and colleges, as well as some of the smaller ones, are included. The two naval teams may, perhaps, be considered as standing between these two classes. The combined averages of the seventy-seven players, consequently, ought perhaps to answer pretty nearly to the description of the average American football player as he is at present. The table represents a great deal of labor in a small space, and contains in many respects a great deal of information not apparent at first sight, but, before analyzing it further, let us turn our attention to some other observations, and consider in detail the changes that were produced in the different items under observation by a course of foot-ball training, lasting, as it does here at the Naval Academy, two months.

1. HEIGHT. As regards height, I may at once dismiss this item by stating that there never was any appreciable change produced in it during the above-mentioned period of two months' training, and the heights are given in the tables for reasons that will become more apparent as we proceed. I must add that I do not wish to be understood by this statement as asserting that the height of foot-ball players is never changed during the training period, but merely that, so far as these observations have extended, such changes have not been observed. Growth in height, however, does not stop in those having undergone training who are still of an age at which development cannot have been completed, for I have observed it to take place after the period of foot-ball training was over.

2. WEIGHT. As regards the influence of foot-ball on the weight of the players, a most decided increase has been noticed. The average increase in weight which was observed and calculated from seventeen players, examined in the fall of 1892, immediately before and after the period of training, with regard to this point, was found to be 3.6 kilos, or 7.9 pounds. The same observations being repeated on twenty-five players in the fall of 1893, resulted in showing an average increase of 3.28 kilos, or 7.2 pounds.

Expressed in percentage, the average increase of the seventeen players examined in 1892 was 4.9 per cent. of their original weight, and in 1893, in the twenty-five players under observation, it amounted to 4.7 per cent. of their original weight, as the "weight" column of Table II. will show.

TABLE II.—INFLUENCE OF TWO MONTHS' EXERCISE AT FOOT-BALL ON THE WEIGHT AND LUNG-CAPACITY OF 25 PLAYERS.

Observations in October and November, 1893.

No.	Age.	Height.	L. cap. i.	L. cap. ii.	Gain.	Weight, i.	Weight, ii.	Gain.
	Yrs. mos.	Ins.	Litres.	Litres.		Kilo.	Kilo.	Kilo.
1 . . .	19 6	1740	4.58	4.75	...	70	72	2
2 . . .	19 10	1832	5.73	6.22	...	75	80	5
3 . . .	21 6	1750	4.07	4.26	...	70	75	5
4 . . .	21 0	1812	4.26	4.34	...	65	64	-1
5 . . .	19 0	1738	4.45	4.45	...	70	70	0
6 . . .	21 3	1688	4.26	4.45	...	65	67	2
7 . . .	17 8	1690	4.45	4.50	...	71	71	0
8 . . .	20 3	1673	3.94	4.07	...	59	62	3
9 . . .	21 3	1696	4.26	4.45	...	62	66	4
10 . . .	20 0	1740	4.45	4.45	...	70	76	6
11 . . .	19 2	1730	4.26	4.45	...	64	70	6
12 . . .	18 1	1828	3.94	4.26	...	71	73	2
13 . . .	19 9	1752	3.94	4.07	...	76	80	4
14 . . .	19 9	1780	4.50	4.91	...	67	70	3
15 . . .	19 6	1802	4.58	5.07	...	75	80	5
16 . . .	17 9	1754	4.07	4.26	...	75	80	5
17 . . .	22 0	1690	5.57	5.73	...	76	80	4
18 . . .	21 1	1805	5.32	5.57	...	67	70	3
19 . . .	21 10	1780	4.91	4.91	0	70	75	5
20 . . .	19 6	1730	5.57	5.90	...	74	80	6
21 . . .	18 1	1858	4.58	4.91	...	69	73	4
22 . . .	20 6	1762	3.76	4.45	...	73	75	2
23 . . .	17 6	1781	4.07	4.45	...	74	76	2
24 . . .	22 4	1828	4.58	4.58	0	68	70	2
25 . . .	20 2	1720	4.07	4.45	...	67	70	3
Av. (French)	19 11	1758	4.53	4.71	0.18	69.72	73	3.28
Av. (English)	19 11	69.2 in.	277 cb.in.	288 cb.in.	11 c. i.	153.3 lbs.	161 lbs.	7.7 lbs.

3. LUNG-CAPACITY. There is perhaps not one single subject in connection with physical training upon which more stress is laid by the more experienced men in this field than the necessity of developing the lung-capacity. The capability of drawing a sufficient amount of oxygen into the system to supply at all times, and under all conditions and circumstances, the amount necessary for the full performance of the various functions of all the living cells in the system must ever be looked upon as a condition *sine qua non* to be aimed at by the physical trainer. The amount of oxygen that an individual is capable of absorbing into his system being largely dependent on the amount of air he will be capable of inhaling in a given time, or in one inspiration, we naturally turn to his lung-capacity, as ascertained by the spirometer, for points regarding his enduring qualities.

On October 15, 1892, the first examination of seventeen players was

made with regard to their lung-capacities, and at the end of November the second examination was made. The result of these two examinations was quite surprising, for all the men, except two, came back with the same lung-capacity on their second examination that they had shown on their first. The only increase that had taken place was noted in two half-backs—who, as is well known, have to do a great deal of running during the game. Thinking that it was possible that the lung-capacity increased in the beginning of the period of training, and that I ought to have taken my first observations on the 1st instead of on the 15th of October, the same observations were repeated this year (1893) on twenty-five players. The results are likewise shown in Table II., where it will be seen that the twenty-five players, after a two months' course of training on the foot-ball field, give us an increase in lung-capacity of eleven cubic inches, or an average increase of 3.9 per cent. of their original lung-capacity. Notice, however, that the percentage amount of increase in weight is 0.8 higher than that of the lung-capacity, a circumstance of some weight in its relation to the subject of "vital index," or the result of a simple division of lung-capacity by weight, and to which we shall again refer later on.

4. TOTAL STRENGTH. According to the *Anthropometric Manual* of Amherst College, published in 1893, by Drs. E. Hitchcock and H. H. Seelye, the tests to be taken of a person whose total strength is to be calculated are as follows:

a. *Expiratory strength.* The subject, after loosening the clothing about the chest and filling the lungs completely, should blow with one blast into the spirometer. Care should be taken that no air is allowed to escape from the sides of the mouth, and that in expelling the air all the muscles of expiration are brought into play.

b. *Strength of back.* The subject standing upon the foot-rest—as shown in Fig. 1, but with the legs straight—and with the dynamometer so arranged that when grasping the handles with both hands his body will be inclined forward at an angle of 60° , should take a full breath, and, without bending his knees, give one hard lift, mostly with his back.

c. *Strength of legs.* The subject, while standing on the foot-rest, with body and head erect, and chest thrown forward (see Fig. 1), should sink down by bending the knees, until the handle grasped rests against the thighs, then, taking a full breath, he should lift hard, principally with the legs, using the hands to hold the handle in place.

d. *Strength of upper arms (triceps).* The subject, while holding the position of rest upon the parallel bars (see Fig. 2), supporting his weight with arms straight, should let the body down until the chin is level with the bars, and then push it up again until the arms are fully extended. Note the number of times that he can lift himself in this manner.

e. *Strength of upper arms (biceps).* The subject should grasp a horizontal bar or pair of rings, and hang with the feet clear from the floor,

FIG. 1.¹



FIG. 2.

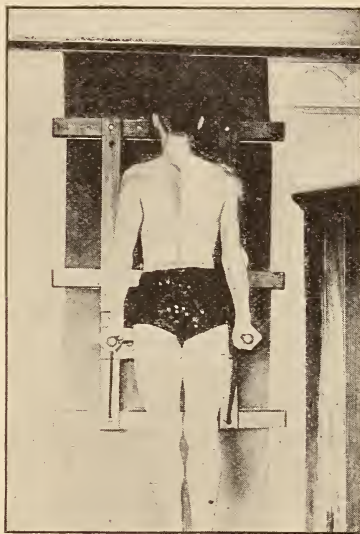


FIG. 3.

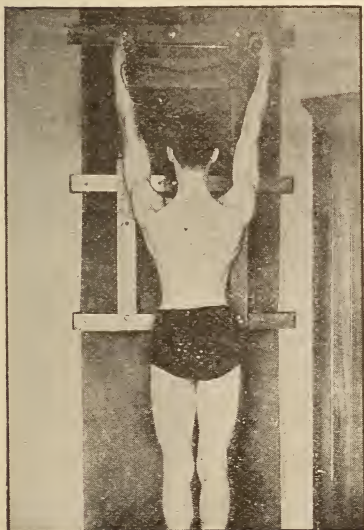


FIG. 4.



while the arms are extended. Note the number of times that he can haul himself up until his chin touches the bar or rings. (See Fig. 3.)

¹ These illustrations are used by permission from *Physical Education*.

f. Strength of forearms. (See Fig. 4.) The subject, while holding the dynamometer so that the dial is turned inward, should squeeze the spring as hard as possible, first with the right hand, then with the left.

The total strength is obtained by multiplying the weight of the subject by the sum of the "dip," *d*, and the "pull," *e*. (This is divided by 10 simply to prevent too great a number of figures in the calculation.) To this is added the strength of back, the strength of legs, the average of the forearms, and the lung-strength, *a*. The sum is the "total strength."

For example: The weight of the subject being 64 kilos, the "dip" 11, and the "pull" 12 = 23; the back-strength 150, and the leg-strength 180, the forearm-strength 45, and the lung-strength 2, the result will be $64 \times 23 \div 10 + 150 + 180 + 45 + 2 = 524$.

This method, as will be noticed, is not intended to give us the exact amount of work that an individual is capable of doing, and which is calculated after a different manner,¹ but rather the total amount of available energy or strength which a person may bring to bear upon an obstacle at any given moment; in other words, it leaves us for the moment in ignorance as regards the endurance.

TABLE III.—INFLUENCE OF FOOT-BALL PRACTICE ON THE TOTAL STRENGTH OF THE PLAYERS.

No.	17 players, av. age 19 yrs. 6 mos. av. height 1765 c.m. or 69.5 in. Observation in 1892.			15 players, av. age 20 yrs. 6 mos. av. height 1763 c.m. or 69.4 in. Observation in 1893.		
	Total strength in kilos.			Total strength in kilos.		
	First exam.	Second exam.	Gain.	First exam.	Second exam.	Gain.
1	648	689	41	572	616	44
2	758	801	43	567	616	49
3	654	703	49	598	685	87
4	621	672	51	785	793	8
5	648	700	52	478	580	102
6	746	832	86	525	686	161
7	521	608	87	724	815	91
8	692	790	98	590	709	119
9	543	649	106	718	780	62
10	753	860	107	631	724	93
11	500	612	112	515	611	96
12	852	974	122	604	686	82
13	500	630	130	666	696	30
14	504	635	131	420	588	168
15	664	836	172	565	648	83
16	692	884	192			
17	626	824	196			
Averages . .	642	747	105	597	682	85

Table III. exhibits the observations of the last two years and their results. The average increase in total strength of the seventeen players examined in the fall of 1892 was 105 kilos, or about 16.4 per cent.

¹ See Report of the Surgeon-General of the Navy, 1893, p. 150.

of their original strength, and that of the fifteen players noted in the fall of 1893 amounted to 85 kilos, or 14.2 per cent. of their original strength. On examining more closely into the distribution of this increase in strength we have found that about 75 per cent. of it extends over the lower extremities and the back, showing that, although all the muscles are engaged in playing the game, there is a quantitative difference of degree.

In the beginning of the last foot-ball season I examined about forty players with the view of getting a larger number for the second examination. But—as a glance at the number of tests that must necessarily be taken of each individual, in order to accurately calculate from the facts thus ascertained his total strength, will show—the individual must be in perfect condition at the time of examination. Bruised hips, knees, ankles, shoulder-joints, elbow- or wrist-joints, and even finger-joints, will make accurate tests impossible; and hence the larger number of them—some of the best among them—could not be examined a second time immediately after the close of the season, and had to be thrown out of our observations to make the remaining ones as nearly accurate as is possible under the circumstances. Here is another reason why it is so difficult to obtain large numbers of observations in this field, and which also may largely account for the fact that no observations of this nature made at some of the other colleges of the United States have, at least up to the present, come to my notice.

Attention has already been called to the "vital index" (Enebuske) as having a certain significance in relation to the results obtained by physical training. The vital index is obtained by dividing the lung-capacity of a person as ascertained by means of the spirometer, and expressed in litres, by his weight in kilos. Démény, in France, from his studies on children, found that in those of the same age the lung-capacity was proportioned to their weight, and that if a curve were constructed of lung-capacity and weight in relation to age, the two curves come out parallel.

Démény found, furthermore, that this ratio was much higher in persons having undergone systematic physical training than in those who had not. These studies of Démény have been repeated in a measure by Enebuske, and their correctness in his hands appears to have received additional support. Démény, quoted by Enebuske,¹ makes this statement regarding the index: "By taking young gymnasts and arranging them according to the decreasing value of their ratio of lung-capacity and weight, we have been able to ascertain that thereby we have made a classification that corresponds sensibly to their degree of resistance."

¹ Observations on the Results of Pedagog-Gymnastics of the Ling System, made at the Boston Normal School of Gymnastics, Boston, 1893.

From our own limited experience with this index we believe it will be found correct for the large majority of cases.

Before leaving the subject of total strength, I must add what appears to me to be a point of considerable interest. It might quite naturally occur to the reader that this so rapidly acquired strength was but a temporary affair, and would vanish again as quickly as it was acquired. As I was myself under this impression, I searched my records, and found that I was somewhat mistaken. In the seventeen players of last fall (1892) the maximum loss six months after the close of the season was only 5 kilos, or less than 1 per cent. Thus, no matter what we may find with regard to the staying qualities of the strength acquired through other sports, foot-ball strength, according to these observations, seems to stay pretty well.

SUMMARY.—In summing up the facts ascertained in the above observations, we obtain as a result of two months' foot-ball training on the seventeen players examined in the fall of 1892: (1) No increase in height, (2) no increase in lung-capacity, (3) an average increase of 4.9 per cent. in weight, and (4) an average increase of 16.4 per cent. in total strength. In the twenty-five players examined in the fall of 1893 we get: No increase in height, an average increase of 4.7 per cent. in weight, an average increase of 3.9 per cent. in lung-capacity, and an average increase of 14.2 per cent. in total strength (17). In both series of observations we have to record a decrease in vital index.

It now becomes clear that in order to form any proper conception as to whether foot-ball is an exercise superior, inferior, or equal to any other form of exercise, we would require a similar set of observations made on the devotees of base-ball, cricket, lawn-tennis, boating, or any other out-of-door exercise, for the purpose of making comparisons. In this respect, however, the literature on physical training is sadly and most painfully deficient; there are, among the large number of books written on the subject, no published accounts with which to make such comparisons. The most we can do at present, therefore, is to form an approximate idea deduced from a comparison of these results with those obtained in the gymnasium. But even here we meet with almost the same scarcity of published results, and thus we cannot escape coming to the conclusion that the much-vaunted benefits derived from athletic as well as gymnastic exercise, *for all we know or can get at*, exist for the most part in the minds of physical trainers, and perhaps in the personal feelings of those who have taken such exercises. Although this may form quite sufficient evidence for some, it will nevertheless not do for the purpose of establishing an incontrovertible fact, as it ought to be established, on sufficient scientific grounds. Science, unfortunately for some, requires proof; opinions may content themselves with faith.

But, the paucity of scientific data to the contrary notwithstanding, we all have at least a very strong suspicion that all forms of exercise, especially the out-of-door ones, do produce good results, not only with regard to their influence on the physique, but also on the mind, the discussion of which, however, from the nature of this inquiry, does not come within the scope of our paper.

In some studies made on fifty naval cadets, and published in the report of the Surgeon-General of the Navy for 1893, the following average increases were noted as a result of six months' systematized exercise in the gymnasium, viz.: 0.5 per cent. in height, 1.3 per cent. in weight, 3.8 per cent. in lung-capacity, and 32 per cent. in total strength. The average vital index at the beginning was 0.067 and at the end of the term 0.066, consequently there was a slight decrease. The average age of the fifty cadets was exactly eighteen years.

According to the measurements in our possession of eight oarsmen, including about two months' hard training for a boat-race during the spring months of 1893, we are enabled to record the following average increases, viz.: 0.2 per cent. in height, 4.7 per cent. in weight, 7.3 per cent. in lung-capacity, and 28 per cent. in total strength. The vital index at the beginning of the period of hard training was 0.066 and at the end it was found to be 0.068; there was, therefore, a slight increase in the latter.

These several items are arranged in the following table:

TABLE IV.

Results of training in	Average Age.		Height.	Weight.	Lung capacity	Total strength	No. of obser.	Time.
	Yrs.	mos.	Per ct.	Per ct.	Per ct.	Per ct.		
1. Foot-ball, 1892	19	6	0	4.9	0	16.4	17	2 months.
2. Foot-ball, 1893	19	11	0	4.7	3.9	14.2	25	2 months.
3. Oarsmen, 1893	19	3	0.2	4.7	7.3	28	8	2 months.
4. Cadets, gym., 1892-3	18	0	0.5	1.3	3.8	32	50	6 months.
5. Cadets, gym., 1893-4	18	0	0.8	1.0	6.5	25.0	74	6 months.

The several methods of training for these sporting events, as well as the system of exercises in the gymnasium pursued nowadays, being so well known, and described elsewhere, a description of them may here be omitted.

The figures shown in Table IV., so far as they may be of value, would lead one to conclude that both the regular systematized gymnasium drill and boating would furnish results superior to those of foot-ball. Boating, considering the large percentage of increase in lung-capacity and total strength which it here shows, must be considered the best training of them all.

Moreover, if we compare the vital index of our average foot-ball player as he appears in Table I., and which is 0.059, with the average vital index of the fifty cadets, which is 0.066, and that of the oarsmen, which is 0.068, the same of the average Yale student being 0.065 and of the average Amherst student 0.061, we find it rather below all of them.

These are the simple unqualified *facts* as to foot-ball. Having now arrived at where we may form at least an approximately true conception of what the results of certain methods of training and exercising are, we must turn our attention to another very important question, and one not to be lost sight of in an inquiry of this character, viz.: Are all the finely-developed young men whom we see in the field at one of our championship games really the result pure and simple of foot-ball play, as is commonly inferred, or might it not also be possible that some of the fine manly qualities which they exhibit have been handed down to them from some not too remote ancestor? In other words, has the foot-ball field exercised a certain *natural selection* in the choice of its devotees, to complement that of the "coach," or are our fine athletic players indeed creations *de novo* of the foot-ball field alone? And this question must be asked with regard not only to foot-ball but also to all our athletic sports. It so happens that it is, comparatively speaking, much easier to prove that natural selection has by far the biggest share in the furnishing of the foot-ball field with its men; its influence in this instance is, indeed, so apparent and so strongly marked that even without the assistance of craniometric data, the anthropological eye may easily discern an overwhelming preponderance of Anglo-Saxon and Germanic types of men, exhibiting to a large extent the good and characteristic qualities, mental and physical, of their blue-eyed, light-haired, and long-headed ancient ancestry. But we need not alone rely on what we merely see with our eyes, for we have in our possession an abundance of material to show that the sport attracts superior types of men from the very start.

To begin with, let us, for instance, first compare the records of our own foot-ball men with those of the fifty percentile grade cadet, confining ourselves in making such comparison to the same items that have formed the bases of all our previous observations, namely, height, weight, lung-capacity, and total strength.

As shown in Table V.: (1) The average age of the thirty-six foot-ball players is but two months ahead of that of the fifty percentile grade cadet, and represents, therefore, the average cadet so far as age is concerned, in accordance with the fact that players are admitted from all the four classes alike; (2) in height we find the foot-ball-player in average 4 per cent. superior; (3) in weight he is 28 per cent. superior; (4) in lung-capacity 21 per cent., and (5) in total strength 49 per cent. superior to his average fellow.

TABLE V.

	Av. age.	Height.	Weight.	Lung cap.	Tot. str.	No. obs.
	Yrs. mos.					
Fifty percentile cadet . .	19 7	1697	57	3.58	454	603
Average foot-ball player . .	19 9	1766	73	4.66	676	36
Superiority in per cent.	.....	4	28	21	49	

In the thirty-six players here represented, and of which number alone complete measurements were available for our purpose, there are included but eleven championship players, the remaining ones are those who never will play in a big game and, consequently, fall below the average; besides, nearly all the measurements represent the player as he is at the beginning of the training period, and without the increase noted to take place from the course of training.

But if even we were to take off from this, the percentage superiority, that which we have shown may be gained during a two-months' course of training at foot-ball, it would scarcely perceptibly lessen the former nor tend to make the conclusion less convincing that natural selection is by far the strongest of the two factors in the production of our finely-developed-looking foot-ball devotees.

Nor need we confine our comparisons to the records of the Naval Academy alone, for there is an abundance of material for comparison on hand outside of it.

Let us take, as another instance, the figures of our average American foot-ball man, as shown in Table I., and compare him with the fifty percentile grade of the Yale students, from tables published by Seaver, and compiled from measurements taken during a period of five years.

TABLE VI.

	Av. age.	Height.	Weight.	Lung cap.	Tot. str.	No. obs.
	Yrs. mos.					
Av. American foot-ball player .	20 8	1773	76	4.55	662	77
Yale student, 50 per cent. . .	19 7	1724	63.1	4.13	458 ¹	(5 years)
Superiority in per cent. .	.....	2.8	20	10	44	

We find by a glance at Table VI. that the average American foot-ball player is (1) one year and one month older, (2) 2.8 per cent. taller, (3) 20 per cent. heavier, (4) has 10 per cent. more lung-capacity, and

¹ Computed from insufficient data, but believed to be approximately correct.—H. G. B.

(5) is 40 per cent. stronger than the fifty percentile grade of Yale students.

Making, finally, a similar comparison with the Amherst student of the fifty percentile grade, and using for this purpose the tables but recently published by Drs. Hitchcock and Seelye, we will find, by examining Table VII., a superiority existing similar to that already noticed in previous tables.

TABLE VII.

	Av. age.	Height.	Weight.	Lung cap.	Tot. str.	No. obs.
	Yrs. mos.					
Av. American foot-ball player .	20 8	1773	76	4.55	662	77
Amherst student, 50 per cent. .	22 6	1720	61.7	3.77	482	2230
Superiority in per cent. .	.....	3	23	20	37	

This selective influence is not only shown in the larger boys, but extends, it would seem, also into smaller communities of boys. There are two sets of boys here who have banded themselves together into foot-ball "teams," and if anyone should think that they do not play the regular game in dead earnest, he may come and pay us a visit during the season and investigate for himself.

The smaller team, which we may, for convenience sake, call juvenile team No. 1, consists of boys of an average age of eight years; and on comparing their average height with that of the fifty percentile grade of the Boston school boys¹—of the same, age of course—we find it to be 6 per cent. superior to that of the latter, and in weight they are 3 per cent. superior.

Juvenile team No. 2 consists of boys of an average age of thirteen; their measurements show, on a similar comparison being made, a superiority to the Boston school boys of 3 per cent. in height and 6 per cent. in weight.

We have seen the statement made somewhere that the class-standing of those of the college students who devote themselves to athletic sports is higher than that of those who do not, and the inference is, that the practice of those sports leads directly up to this result. We do not doubt for a moment the absolute correctness of the statement, but the inference may have to be slightly modified, for in view of the above facts we must likewise admit, at least, the possibility of an influence of the principle of selection; this influence admitted, we would rather expect to find what is implied in the above statement as a natural coincidence, than try to explain it on other grounds. We do not doubt in

¹ H. P. Bowditch: Growth of Children, etc., Boston, 1891.

the least that bodily exercise influences the functions of the brain most favorably, but it does this indirectly, for, in order to produce any measurable changes in the quantity and quality of brain work, its influence would have to be much more profound than it is, and be continued for many generations, for the results of thousands of years of Nature's work on mankind are not so easily influenced as to be educated away by an afternoon's practice at foot-ball.

What, now, it may be asked, have we learned from these observations? Do they prove that gymnastic exercise is a mere fad, and that foot-ball is worthless? They do neither; but on the contrary, if they prove anything, they plainly show that, if we have placed our foot-ball ideal unadorned on the balance, we have not found it wanting; and while it cannot be considered the best game in the world, and much of its vaunted superiority is due to popular clamor conjured up by the newspapers, it must, nevertheless, be considered as *one* of the best games extant. Based on these observations, we may feel ourselves on much firmer ground than we did before, if even we have to limit our arguments to the point of physical training alone, and cannot, from the nature of our inquiries extend our conclusions to the other manifold beneficial results produced by the game, the investigation of which must be relegated to the psychologist.

On the other hand, if physical training is to stand, do not let us base our conclusions on false premises, for unless we take care that our grounds are true, broad, and deep, a sudden wave of popular indignation may some day cause it to come to a premature end, or, to say the least, seriously impede its onward march!

The question of policy regarding foot-ball, and as to how it should be played and managed in the future, has been so ably discussed by Drs. White, Wood, and Roosa, as well as Presidents Schurman, Angell, and Warfield, that there remains but little to be added to it here.

The greatest danger that threatens foot-ball, by unanimous consent, seems to be the introduction of the professional element into its constitution. This, again, must be looked upon as the direct consequence of newspaper clamor.

Unless, therefore, our college faculties will get together and arrange a special selective course leading up to the degree of Bachelor of Athletics, thus dignifying the game at once as a profession, which, I fear, they are not yet prepared to do, we will have to use a certain amount of discrimination and play foot-ball with more moderation, confine the game to the undergraduates and to the college-campus if it is to continue to live.

But how about the number of injuries and even deaths that have been recorded as having been produced on the foot-ball field? While it must be admitted that accidents may occur here as elsewhere, and in

spite of all proper precautions having been taken, it is, nevertheless, probably also true that, were all the circumstances surrounding these cases known, all the recorded deaths, without an exception, would be found traceable to gross carelessness of one kind or another. At any rate, since we cannot eat our pie and have it too, we shall have to pay a certain amount for the good we derive from it; and, if we should find that our investment does not turn out a gold mine, we may be satisfied with a silver one. But, certainly, all the injuries produced on the foot-ball field, in games played between gentlemanly and well-matched players, that have come under our observation have been amenable to treatment and have resulted in perfect cure.

The one precaution mentioned by President Warfield, viz., to make the medical director in charge of physical training omnipotent in excluding boys who are unfit to play in this game by reason of certain physical conditions or injuries existing, cannot be too strongly urged upon college faculties and those who wish to see the game survive.

REVIEWS.

THE NATIONAL DISPENSATORY: containing the Natural History, Chemistry, Pharmacy, Actions, and Uses of Remedies. By ALFRED STILLÉ, M.D., LL.D., Professor Emeritus of the Theory and Practice of Medicine and of Clinical Medicine in the University of Pennsylvania; JOHN M. MAISCH, Phar.D., late Professor of Materia Medica and Botany in the Philadelphia College of Pharmacy; CHARLES CASPARI, JR., Ph.G., Professor of Theoretical and Practical Pharmacy in the Maryland College of Pharmacy; and HENRY C. C. MAISCH, Ph.G., Ph.D. Fifth edition, with three hundred and twenty illustrations. Pp. viii., 1903. Philadelphia: Lea Brothers & Co., 1894.

THE enormous strides which mark the advance of the knowledge of the natural history, chemistry, pharmacy, actions and uses of medicines are never so strongly impressed upon the physician as they are at the time he carefully reviews a book of this magnitude. Especially when one considers that the sweeping and radical changes which have been introduced into the last edition of the United States Pharmacopœia have necessitated an entire re-writing of the descriptive portions of the work does he realize how greatly the fifth differs from the fourth edition. And when it is taken into consideration that the past few years have been years of unprecedented activity on the part of botanists, chemists, and therapeutists—not only in the production and testing of an enormous number of new drugs, but also in the verification of the facts supposed to be established about the older ones and in extension of the field of employment of those well understood—we can well appreciate the fact that this, as compared with the last edition, is practically a new book, and as compared with the first edition, which, as a student, we read fifteen years ago, it is an encyclopædia contrasted with a text-book. The various editions have all borne the impress of the ripe scholarship and practical experience of Stillé on the therapeutical and clinical side, the accurate learning and broad botanical and pharmaceutical knowledge of Maisch—ably supplemented, in the last, by Caspari, Jr. Not content with our own Pharmacopœia alone, which in its last edition is creditable to the best pharmaceutical and therapeutical knowledge which obtains in this country, the editors have frequently broadened the scope of the work by references to the British and German Pharmacopœias and to the French Codex.

The *Dispensatory* proper occupies seventeen hundred and thirty-seven clearly and cleanly printed pages—practically a combined chemistry, botany, pharmacy, materia medica, pharmacology, and therapeutics, for the pharmacist and physician. Omissions are few in number. Cocillana, which has a good present with the prospect of a substantial future, certainly deserved mention. Asaprol does not receive

due attention, in that the later work of Dujardin-Beaumetz and others is not reported. Oleum betulæ volatile, a preparation of the last edition of the Pharmacopœia, is entitled to have a heading of its own, in its proper place amongst the olea, and should not be a sub-head under oleum gaultheriæ. Very rarely does one find typographical errors: page 1310, $3K_2MnO_4$ is found instead of $3K_2MnO_4$; chlorodine appears in the index, instead of chlorodyne; euphorin is euprophin in the index, thus making the usual confusion with euprophen much more likely.

The Appendix covers fifty-two pages and treats of Reagents and Tests; Volumetric Assays; Saturation Equivalents of Acids; Alkali and Acid Percentages of Salts; Table of Elements; Formulas and Molecular Weights of the Principal Chemicals and Reagents; Equivalents of Weights and Measures; Tables of Weights and Measures; of the Relation by Degrees of Baumé's Hydrometer to Specific Gravities, and of Thermometric Equivalents; and an alphabetical List of Official Drugs in the United States and British Pharmacopœias and the preparations containing them.

The General Index (to botany, materia medica, chemistry, and pharmacy) covers seventy-six three-columned pages; the Index of Therapeutics occupies the remainder of the volume—thirty-six pages. The thoroughness of the indexing may be appreciated when it is stated that there are twenty-five thousand references. Minor advantages, as the full list of synonyms, large numbers of chemical formulæ, temperatures given both in Centigrade and Fahrenheit, weights and measures in both metrical and apothecaries' systems, and references to current periodical literature, are best appreciated by the teacher and author, but are as well useful to the practising physician and the pharmacist. The best test of the accuracy and usefulness of a book is to be found in its availability in solving the questions that arise each day. During the past four months this volume has been in constant use, and very rarely has its information been found to be incomplete or inaccurate.

Not only has the editorial work been excellently done, but the mechanical making is of the best; the book is made to be used, and it is likely to be in constant requisition. In comparison with similar works of foreign origin, we feel that it will not suffer, but that it will stand on its merits as a monument to the persistent industry, broad information, scientific investigation, and scholarly attainments of the authors.

R. W. W.

AN AMERICAN TEXT-BOOK OF THE DISEASES OF CHILDREN, BY AMERICAN TEACHERS. Edited by LOUIS STARR, M.D. Pp. 1148. Philadelphia: W. B. Saunders, 1894.

THE first chapter of this excellent book—"Clinical Investigation of Disease and Management of Children," by Dr. Louis Starr—is a clean bit of work, which affords good evidence of the editor's ability to illustrate the art of "condensation without omission," which he announces in his preface as an essential condition in the making of a successful text-book.

Among the divisions of this first chapter, "Feeding" may be cited as an example of sound and rational treatment of a subject which has been much overwritten hitherto. It is pleasant to find the opinion regarding

the employment of wet nurses which most of us have been driven to adopt, indorsed by such good authority, and that he considers it preferable in a majority of cases to trust to careful bottle-feeding. All essential facts are clearly stated in his directions for artificial feeding, and it is evident that the author's experience has proved that few hard-and-fast rules can maintain in all cases; that the lacteal secretion of the cow alone (no matter how artfully mixed, diluted, and sterilized) will not nourish every baby; that *nascitur non fit* applies occasionally to infant dyspepsias as well as to poets. The directions given for sleep, baths, clothing, and exercise are admirable.

"Tuberculosis," by Dr. Osler, gives a thorough and well-defined description of the various forms of disease which the infection causes in children; and while the entire paper is most readable, that portion relating to pulmonary tuberculosis from a clinical standpoint is especially good. The fact that a broncho-pneumonia (either in the form of an acute suffocative bronchitis, or the commoner type) is frequently merely a death-mask assumed by tubercle, is very clearly brought out, and the difficulties of diagnosis under these conditions are emphasized, while the rarity (in this country at least) of a pulmonary tuberculosis simulating a frank pneumonia receives due mention. In Dr. Osler's opinion, the estimate that 10 to 15 per cent. of the dairy stock in the Eastern States is tuberculous is probably a low one.

The eruptive diseases are all well done, and none of them overdone—the chapter on "Scarlet Fever," by Dr. Marcus P. Hatfield, being particularly good. How much is gained by the insertion in this or any other medical work of colored plates is a question which each reader must answer for himself. In regard to the quarantine which should be enforced in cases of measles, Dr. Starr, in recommending a period of three weeks, differs from some other authorities, who do not hesitate to allow children who have been isolated to return to the common wards a fortnight from the date of the appearance of the eruption.

"Asiatic Cholera," by Dr. Edward O. Shakespeare, and "Diphtheria," by Dr. Dillon Brown, may be cited as two of many practical and thoroughly modern papers which this book contains. The latter, when taken in connection with the chapters on "Intubation and Tracheotomy," by Dr. Henry R. Wharton, satisfactorily disposes of membranous deposits in the air-passages, whether caused by the Loeffler bacillus or not. It is to be regretted that Dr. J. Madison Taylor, in his excellent chapter on "Exercise and Massage," does not devote a little space to the effects of bicycling on the growing spinal column. It would be interesting to learn whether, in the opinion of one who had made a special investigation of the subject, the growing generation will walk erect in God's image or permanently bow to the influence of this popular sport. A word or two from so good an authority as to the effects upon the figure of the "scorcher" attitudes assumed by most of the lively young people who are rapidly depriving their elders of all rights in public thoroughfares would be most timely.

"Injuries and Diseases of the Newborn," by Dr. Edward P. Davis, is a carefully considered and thoroughly well-written paper which is of interest alike to the pædiatrist and accoucheur.

Dr. Henry D. Chapin has contributed a first-rate article upon "Hereditary Syphilis." It contains a clear and concise description of the disease, but in regard to the treatment which he recommends there

is certainly room for difference of opinion. In speaking of mercurial inunction, Dr. Chapin says: "It is probable, however, that it will be found, as a rule, more satisfactory to employ internal medication." In contrast with this, one or two of the axioms of the highest living authority are worth quoting: "You cannot salivate without teeth;" "Very young infants bear mercury internally only in doses sufficient to allow them to die;" and "*Leur salut est dans les frictions.*"

"Whooping-cough," by Dr. J. P. Crozer Griffith, is a most satisfactory chapter. The only criticism to which it is open is that the belladonna treatment is not described sufficiently in detail. We think it should be impressed clearly upon the mind of the reader that it is only by keeping the patient under careful supervision and giving the drug in doses sufficient to insure the almost constant presence of one or more of its physiological symptoms *for two or three days* that the best results are obtained in obstinate cases. Used in this way it rarely disappoints. Prescribed in insufficient doses it is no more of a specific than a dozen other drugs which are merely placebos to satisfy the minds of the attendants while the cough takes care of itself.

In an able and conservative paper, Dr. J. Lewis Smith offers what appears to be the only rational explanation of the frequent occurrence of rachitis in children whose surroundings are good, but who are fed exclusively upon proprietary foods. The element which is lacking, as clearly shown by the careful analysis of Prof. Albert R. Leeds (in his admirable contribution, "The Chemistry of Milk and Artificial Foods for Children") is fat. After a brief consideration of the claims made by the advocates of phosphorus, he arrives at the conclusion that while combining this drug with cod-liver oil does no harm, the latter must remain our sheet-anchor so far as internal treatment is concerned.

In Dr. J. M. Da Costa's article on "Rheumatism" we have just what might be expected from the pen of so eminent an authority and wise observer. He notices the intimate relations between the disease in question and certain forms of pleurisy which is so strongly insisted upon by the best French practitioners. Regarding the salicylate treatment, his opinion that it should be discontinued if good results are not speedily obtained will be indorsed by many of us who have persisted only to meet with disappointment, if nothing worse. His recommendation that the full dose be used at the outset, and then diminished, is a point of great practical importance, while his expressed conviction from experience that the salicylates neither prevent nor benefit cardiac complications must furnish food for reflection.

"Diseases of the Mouth," by Dr. Frederick Forchheimer, is well worth reading. That portion which is devoted to dentition deserves special attention, as in addition to an admirably clear description of the process of teething, the author attacks the gum-lancet with much vigor and originality. The conclusions which he arrives at as the net result of an apparently flawless argument are: 1. "Gum-lancing is useless: (a) so far as giving relief to symptoms; (b) so far as facilitating or hastening teething. 2. It is useful only as a bloodletting or as a suggestion, and ought not to be used as such. 3. It is harmful: (a) in producing local trouble; (b) in producing great disturbance on account of hemorrhage; (c) in having established a method which is too general for specific good and too specific for universal use. 4. It is to be used only as a surgical procedure to give relief for surgical accidents." Nothing

which we could say in the way of comment on the above could possibly go straighter to the point than the editor's note which appears at the end of the chapter: "The author certainly presents in a very forcible manner one side of the disputed question of the advisability of gum-lancing. That too many aberrations from health are laid to the score of teething, and that lancing is often performed heedlessly, unnecessarily, and even injuriously, cannot be questioned, yet there are many well-informed physicians and clinicians who use the lance in appropriate cases, because experience—the crucial test—has demonstrated its utility. In this class the editor must be included."

"Diarrhoeal Diseases," by Dr. Victor C. Vaughan, deserves more than passing notice. Following his statement that "the gravest symptoms in the most speedily fatal cases are often accompanied by the most superficial lesions, while on the other hand symptoms so mild that no anxiety is awakened may result from marked and extensive pathological changes," and that "it would be as unscientific to attempt a classification of the diarrhoeas of infancy founded upon pathological anatomy as it would be to designate acute, subacute, and chronic arsenical poisoning as desquamative, catarrhal, and ulcerative gastro-enteritis," he gives us a classification based upon the etiology of the various forms of diarrhoea which certainly seems a practical working scheme from a clinical standpoint.

Briefly stated it comprises: (1) Acute and chronic intestinal indigestion (from excessive or improper feeding), which do not differ essentially from similar conditions as observed in adults, and are comparatively independent of seasonal influence; (2) acute and subacute "*Milk-infection*," which correspond to cholera infantum and gastro-enteritis in ordinary nomenclature. This is assuredly a most practical and ingenious method of solving a vexatious problem, and good results will follow a general adoption of the term "milk-infection" in the shape of increased vigilance in guarding milk supplies from contamination. The name well defines the gastro-intestinal troubles of very young children in hot weather, and at the same time proclaims the *fons et origo* of infantile mortality during the summer months. We readily credit the writer's statement that he has not been led to adopt a new nomenclature for the sake of introducing a novelty, and congratulate him upon his happy thought.

"Gastric Catarrh and Gastric Ulcer," by Dr. A. D. Blackader, of Montreal; "Dysentery," by Dr. Samuel S. Adams, and "Diseases of the Liver," by Dr. John H. Musser, are thoroughly satisfactory examples of many excellent papers which this work contains, and in which the authors have confined themselves to such facts and theories as are necessary to a good comprehension of the subjects they write of, and avoid any undue emphasis of personal opinions. A vast majority of the contributors have practised self-effacement rather than assume any risk of impairing the value of this admirable text-book, and when we consider the *personnel* of the corps we cannot but admire their modesty and honesty of purpose in restricting themselves to what certainly must have seemed to them dry bones indeed.

The leading facts concerning "Intestinal Parasites" are well stated by Dr. Charles W. Townsend. Oil of male-fern and pelletierine are justly recommended as the most efficient remedies for tapeworm, and very little space is wasted in enumerating the drugs which, in spite of their reputation as tæniacides, almost invariably fail to remove the head.

It is a pleasure to read so good a description of "Mucous Disease" as that written by Dr. William A. Edwards. Notwithstanding the fact that the pathology of the trouble (has it a special pathology?) remains obscure; it is a condition which forces recognition as differing essentially from the membranous enteritis of adults, and no one can afford to ignore it. The treatment is satisfactorily described; we agree with the writer in his expressed belief that intestinal asepsis to a beneficial degree may be obtained by the use of internal remedies, which he recommends.

Dr. William Perry Northrup embodies in his chapter on "Scorbutus" much valuable information concerning a disease which we never before have associated with children of American birth and parentage. Among his cases he cites one of a typical scurvy in a child whose surroundings were all that wealth can provide. The most frequent direct cause in his opinion is prolonged feeding with proprietary foods and canned milk. Here again it will be observed that the question of an insufficient supply of fat comes up just as it does in the causation of rhachitis. What with 15 per cent. or more of our Eastern cows tuberculous, and proprietary foods lacking in an essential element of nutrition, the American infant is indeed caught between the devil and the deep sea.

"Tubercular Meningitis," by Landon Carter Gray, is a first-rate paper, which in spite of its brevity, gives a comprehensive view of the disease. Its pathology is concisely and admirably described. The same remarks apply equally well to Dr. Frederick Peterson's article on "Convulsions" (a subject which as usually treated is a positive affliction to the conscientious reader), and to Dr. M. Allen Starr's "Chorea." In this last-mentioned disease it is certainly quite possible to give Fowler's solution in much larger doses than fifteen drops *ter in die* without producing any of the usually described physiological symptoms of its effects, particularly if the drug be given in an alkaline diluent—but as a well-marked peripheral neuritis of the lower extremities is very liable to follow such heroic exhibitions, the wisdom of adhering to this as a maximum dose (in accordance with Dr. Starr's recommendation) is obvious.

In a short paper on "Broncho-pneumonia" Dr. William Pepper expresses his belief that its specific cause is probably Fränkel's pneumococcus—an opinion which certainly deserves serious consideration, coming as it does from so high and experienced an authority, although differing from the conclusions arrived at by Claisse from a recent series of careful researches. The clinical aspect of the disease, as usually observed in this country, is admirably described, and it is to be regretted that the brevity of this contribution has compelled the author to omit any description of the very acute and fulminant type which is observed in overcrowded tenements and public institutions where large numbers of infants are housed in a single ward. No mention is made in this chapter of the probably infectious nature of this form of the disease, which is held as proven by Simon, Sevestre, Hutinel, and all the best authorities in Paris, where it has been carefully observed and closely studied during the past three years. "Croupous Pneumonia," by the same author, is clearly written and good in every way.

A short chapter on "Fibroid Phthisis" by Dr. Frederick C. Shattuck, is thoroughly satisfactory, as might naturally be expected. A thoroughly practical contribution on "Pleurisy," by Dr. Henry Koplik adds to the value of that portion of the book devoted to pulmonary diseases.

The symptoms and diagnosis are particularly well done. In advising against the use of iodine and blisters he is assured of the sympathy of all true friends of children.

"Bronchitis," by Dr. Walter S. Christopher, is one of the best of many admirable papers. It is thoroughly modern, and we are glad to observe that in his second paragraph he loses no time in promptly discountenancing any attempt to resurrect the corpse of capillary bronchitis—which is even at this late day occasionally spoken of as an entity—and disposes of its ghost in just three and a half lines. Broncho-adenitis—as he happily terms inflammation of the bronchial glands—he regards as probably the most important cause of recurrent bronchitis, and he indorses the view that any acute bronchitis, no matter how trifling, may lead to their enlargement. The whole article is most readable; but we must take exception to his statement that "expectorants are often of great service in the earlier stages . . . when the secretion is scanty and the râles few and dry, and the cough in consequence frequent and harassing"—not senega, surely, nor yet squills. But we are not disposed to quarrel with Dr. Christopher about the meaning he attaches to the word "expectorant," and would far rather discard the generally accepted definition than miss the reading of so good a piece of work as he has given us.

"Diseases of the Skin," by Dr. William A. Hardaway, is well written and sufficiently thorough. In speaking of the etiology of alopecia areata, he ranges himself on the side of those who regard it as a tropho-neurosis in spite of Besnier's expressed conviction that he has observed instances of contagion in his wards at the St. Louis. It has been impossible to notice many of the contributions which possess as much merit as any we have mentioned.

This is far and away the best text-book of children's diseases ever published in the English language, and is certainly the one which is best adapted to American readers. We congratulate the editor upon the result of his work, and heartily commend it to the attention of every student and practitioner.

F. G. M.

LES UNIVERSITÉS DES ÉTATS-UNIS ET DU CANADA. By DR. O. LAURENT, Agrégé Suppléant à l'Université de Bruxelles. 8vo. pp. 307. Bruxelles: Lamartin, 1894.

THE UNIVERSITIES OF THE UNITED STATES AND CANADA.

So much has been written in America on the medical institutions of the old world, that it is quite refreshing and pleasant to see any study of the medical institutions of the new world, especially when it is made by so distinguished a teacher as the well-known surgeon and professor in the University of Brussels. Prof. Laurent has taken advantage of an extended official journey in America to prepare this admirable volume covering the medical colleges and hospitals in New York, Philadelphia, Baltimore, Washington, Ann Arbor, Chicago, New Haven, Boston, St. Louis, San Francisco, and Canada. He has been at great pains not only to copy the statements made in official documents in connection with these schools and hospitals, but has also made observations of his

own, even of minute details; such, for instance, as commendation of the mode of bacteriological illustration at the Jefferson Medical College, when culture-tubes fixed in series on a card and properly labelled were passed around the class, or in his minute observation of the buildings and appliances of the Woman's Medical College of Philadelphia. In general he is very exact. The only error of importance which we have observed in figures is the amount given for the Syms Operating-theatre, which he states at 1,837,500 dollars instead of francs (\$350,000), which error appears twice in the book. We notice also that although the French language has a "y," yet "McBurney" appears as "McBurnet." Still more curiously, Yale University appears throughout the book as "Iale." Other than these trifling defects the accuracy of the book is very remarkable—not only in the spelling of foreign names, where errors might be expected, but, so far as we have observed, in his description of our methods and results. We notice also that he very rightly states that nowhere will one meet with establishments better organized and more marvellously rich than at Johns Hopkins, the Syms Operating-theatre, and the Universities of Chicago and San Francisco.

Moreover, he draws a sharp distinction between the orthodox schools and the heterodox—under which he includes the homœopathic, eclectic, botanic, etc. He is evidently markedly in favor of women's medical schools, and gives forty pages to their consideration, including the higher education of women in general and especially their medical education. In a table opposite page 128 he gives a chronological survey of the gradual victories of women in seeking for admission to medical societies, beginning with Iowa and Kansas in 1872, and finishing with Pennsylvania in 1881. He notes that in San Francisco the male and female students dissect together, as at Paris and Brussels.

On the whole he justifies his study—in spite of our supposed Americanisms, and even (a term which strikes our transatlantic ears as a little odd) our "puffism"—by the originality and the rapid progress which he recognizes in this country, in his remark, "On marche là bas à pas de géant." He notes the rapid organization of schools in this country, and suggests that the race would be much better by the early death of a large number. Naturally he urges a longer course of study, but to those of us who are struggling with the possibilities of a four years' course, his desire that we shall prolong it to five, six, or even seven years, makes one shrug his shoulders. It shows, however, that the tendency both in this country and abroad is steadily toward a larger and broader medical education. His criticism that our entrance examinations are too lax, and that we ought at least to make our medical course five years and precede it by two years of scientific study may well be taken *au sérieux*. We note with pleasure his commendation of our dental schools and his hope that Belgium may follow in the same path.

W. W. K.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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PROFESSOR OF CLINICAL MEDICINE AND THERAPEUTICS AT THE NEW YORK POST-GRADUATE
MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

ANTIPYRINE AS A VESICAL ANALGESIC.

M. E. VIGNERON, from his observation of three cases, believes that this drug can render some service in urinary surgery. The first point established is that in the bladder it is perfectly harmless, even after a usage prolonged through months. In depicting the very profound and extended lesions of the bladder which increase the power of absorption of the mucous membrane and which contra-indicate the use of cocaine—which may be dangerous even in a healthy bladder—there has not been observed any general accident, neither on the part of the skin nor in the digestive tract, nor any interference with the function of the kidneys. Even a local tolerance may be found. Antipyrine has already been used in the bladder as a hæmostatic, without any result, it is true, but also without any complication and without especially increasing the infection. It can, then, be considered as a sufficient antiseptic, even better than the boric solutions. As an analgesic, its solution, left in the bladder, suppresses painful contractions. When it is placed only temporarily in the bladder for the purpose of suppressing the pain which may be produced later by a local application, it still has an analgesic action but it is less marked. If the percentage of the solution is low (1 to 200) it does not act, or only slightly, and provided that it be kept in place for a long time—twenty minutes at least, which is far too long for practical purposes. A stronger solution (1 to 25) acts sufficiently, in ten minutes, for diminishing the pain of an instillation or washing to be subsequently made. This treatment is indicated in all cases of cystitis in which topical treatment is painful. In bladders which are not distended, two and one-half to five drachms of the last-named solution left for ten minutes is sufficient. For distended bladders six times this quantity of a solution (1 to 100 or 200) is necessary after a preliminary washing, and this should be left in the bladder. —*Annales des Maladies des Organes Génito-urinaires*, 1894, No. 5, p. 348.

THE TREATMENT OF CHRONIC CYSTITIS BY INSTILLATIONS OF
CORROSIVE SUBLIMATE.

DR. ANT. BARBIER notes that it is inconvenient to distend the bladder in cystitis, and besides it is excessively painful, so that washing with more or less large antiseptic solutions is hardly satisfactory. Under the use of instillations the number of daily urinations decrease from thirty to six or eight, and the bladder capacity increases. The pain rapidly disappears, ordinarily in the first days of treatment; even if it is not completely relieved it is markedly lessened. Urine which is turbid, sanguinolent, containing more or less pus, clears up under the influence of sublimate. The various microbes diminish and disappear as the local condition improves. The instillations should be employed every day, commencing with 1 to 2000 and gradually increasing the strength until 1 to 500 is reached. In the bladder 30 to 75 drops is a sufficient quantity. At the neck and in the deep portion of the urethra 10 to 15 drops is sufficient. The solution should be prepared without alcohol, and four times as much tartaric acid as one uses of sublimate should be added.—*Revue de Thérapeutique Médico-chirurgicale*, 1894, No. 8, p. 203.

THE ABSORPTION OF IRON IN THE ANIMAL BODY.

DR. A. B. MACALLUM calls attention to the fact that Bunge's researches have in recent years done much to unsettle the medical dogma that the iron contained in drugs enters directly into combination with the red corpuscles to form hæmoglobin. Regarding his theory of the direct conversion of iron-containing nucleins in the food ("hæmatogen") into hæmoglobin as extremely doubtful, the author has attempted to determine, first, whether or not inorganic compounds of iron are absorbed, and secondly, whether certain organic compounds of iron are absorbed. Although the experiments under the second head are not yet completed, the following conclusions are submitted: 1. The experiments on the administration of inorganic compounds of iron to guinea-pigs and other animals, have resulted in showing that the intestinal mucosa absorbs these to an extent which varies with the nature of the compound and the quantity of it given. When the dose is small, absorption occurs only in that part of the intestine adjacent to the pylorus and measuring only a few inches in length; but when the quantity given at any one time is large the absorptive area may embrace the whole of the small intestine. In the former case the result appears to depend on the complete precipitation, as hydroxide, of the iron of the salt unabsorbed, in the thoroughly mixed bile, chyme, and pancreatic juice; in the latter case the large amount of the iron salt apparently first destroys the alkalinity of these fluids, the excess of the salt unaffected and remaining in solution then undergoing absorption. 2. The intestinal epithelial cells transfer the absorbed iron at once to the underlying elements when the quantity absorbed is small, but with a large amount absorbed, the epithelial cells are found to contain some of it. 3. Though some of the sub-epithelial leucocytes of the villi appear to carry part of the absorbed iron into the general blood-circulation, probably the more important agent in the transference of the inorganic iron from the villi to other parts of the body is the blood-plasma. 4. Marfori's albuminate

and the commercial "peptonate" of iron, when administered to guinea-pigs, seem to stimulate the leucocytes to invade the epithelial layer of the intestinal villi. 5. Of the organic iron compounds belonging to the "chromatin" class, that found in egg-yolk (hemæto-gen of Bunge) undergoes absorption in the intestine of the guinea-pig and of *amblystoma*. In these, but more especially in the latter, after they are fed with egg-yolk for several days, the cytoplasm of the liver cells yields a marked evidence of the presence of an organic iron compound belonging to the "chromatin" class and derived from the yolk fed. 6. The mode of absorption of yolk "chromatin" is obscure, but the process appears to be in some way connected with the absorption of the fat with which the iron compound is closely associated in the yolk.—*The Journal of Physiology*, 1894, Nos. 3 and 4, p. 268.

SOLUTION OF GOLD AND ARSENIC BROMIDES.

MR. FRED. A. SIEKER contributes a timely paper upon this subject, which is receiving so much attention and about which so many contradictory statements have been published. He concludes: 1. An aqueous solution of arsenous bromide and gold bromide has not been accomplished. 2. Bachmann's and Barclay's solutions contain gold bromide, arsenic acid, and hydrobromic acid. 3. Arsenic bromide (AsBr_3) has never been isolated.—*Notes on New Remedies*, 1894, No. 12, p. 179.

THE PHYSIOLOGICAL ACTION OF SPARTEINE.

DR. DAVID CERNA, noting that this drug although used extensively in practical medicine has not been investigated physiologically to any extent, reports a series of experiments. The results are as follows: On the muscular system, after minute doses, there is a brief period of increased muscular irritability, which, however, soon disappears. No marked depression of normal irritability has been noticed even under massive quantities of the drug. On the nervous system there is no direct proof, experimentally or clinically, that this agent acts as a narcotic. Its influence is exerted particularly upon the lower nervous system, and in moderate, especially small doses, causes an increase in the reflexes, and this increase is of centric origin. This stimulation of reflex activity is generally followed by a distinct depression. Sparteine so stimulates the system as to cause convulsions, usually of a tetanic nature. This phenomenon is not the result of a peripheral action of the drug, but is spinal in origin. So also when death occurs, the paralysis is the result mainly of its action on the cord itself. On the circulation, if the drug is introduced into mammals intravenously, there occurs at first a slight rise of the arterial pressure accompanied with an increased action of the heart. In a short time both the rate of the pulse and the height of the blood-pressure fall below the normal standard, to return, if the dose is not pushed, to the original point. If the ingestion of the drug, however, be continued, the depression, with slight variations, is gradual until the occurrence of death of the animal. A noticeable phenomenon is the enormous increase in the size of the individual pulse-waves accompanying the reduction of or the frequency of the cardiac beat and the fall of the arterial pressure. Ex-

periments upon the heart showed that the drug powerfully stimulates the cardiac muscle and probably also the intra-cardiac ganglia. Finally these become completely paralyzed, and the organ is arrested either in systole or diastole. Finally, it is seen that the actions of this drug upon both the arterial pressure and the rate of the pulse, in normal animals are not by any means constant, the effects being undoubtedly dependent not only on the size of the dose administered but also upon which one of the actions predominates.—*American Medico-Surgical Bulletin*, 1894, No. 7, p. 392.

THE STRENGTH OF THE PHARMACOPŒIAL TINCTURES.

THE editor calls attention to the danger which attends the use of preparations of Calabar bean. The last edition of the U. S. P. has increased the strength of the tincture of physostigma in the proportion of 68 to 38. Tincture of gelsemium is one-seventh stronger, and tincture of stramonium is twice approximately as strong as in the previous edition. On the other hand, the strength of the tinctures of Indian cannabis, musk, and veratrum viride has been reduced.—*Bulletin of Pharmacy*, 1894, No. 5, p. 197.

VACCINATION BY GRATTAGE.

DR. ORTEGA has noted in the epidemic of smallpox which occurred in Mexico in 1890, that a large number of railway employés who contracted the disease presented the very large and unsightly cicatrices of vaccination by *grattage* (scraping). Among those vaccinated by *piqûre* (sticking) a very small number only contracted the disease, and in these it was mild, while in those vaccinated by grattage it was, in general, severe. The re-vaccination by piqure in those previously vaccinated by grattage was almost always successful, while this was the exception in those vaccinated by piqure. The patients vaccinated by grattage almost always suffer from inflammations in the vaccinated member of greater intensity and of longer duration than subjects vaccinated by piqure. Finally, vaccination by the former method frequently produces cicatricial keloids. The pustules developed by grattage are probably septic, not vaccine pustules, because the larger surface allows the absorption of septic elements, while by the piqure, although repeated several times, vaccine lymph only is introduced.—*Bulletin général de Thérapeutique*, 1894, 16e livr., p. 369.

THE TREATMENT OF TUBERCULOSIS BY CINNAMIC ACID.

DR. ALBERT LANDERER states that this remedy and its salts, in a 5 per cent. solution, is in the highest degree productive of a leucocytosis, which begins within two hours after intravenous injection, and reaches its maximum in eight hours, the leucocytes being increased two and one-half fold. In intramuscular and subcutaneous injection there is also a leucocytosis, but much less than from intravenous injection. The number of red corpuscles is not lessened nor the hæmoglobin decreased. Eighty-four cases of internal tuberculosis were under observation. A five per cent. watery emulsion of sodium cinnamate was used for intravenous injection in large doses, three times each week; in severe cases, six to eight weeks must elapse before improve-

ment is noticeable. Intravenous injection is not difficult, but absolute asepsis must be observed. The results obtained seem to have been excellent, and the most favorable termination which could be desired—the production of fibrous tissue and walling-in of the process—was reached. The relief seems to be permanent in the various stages when secured.—*Therapeutische Monatshefte*, 1894, Heft 2, S. 47.

[The amount of the drug to be used is not stated.—R. W. W.]

THE ACTION OF CALOMEL AND OLIVE OIL.

VICTOR SCHULTZ has noticed that in a patient upon whom a necropsy demonstrated that no gall-stones existed, a few hours after the administration of olive oil the gall-bladder, which up to that time had been soft and insensitive, became very tense, sensitive, and painful, and then acquired that degree of painfulness which could be characterized as gall-stone colic. The significance of the fact is that the ingestion of olive oil is followed by a marked excretion of bile. As regards calomel, it has no influence upon a markedly increased biliary excretion; but rather, in gall stones and diseases of the biliary passages, it acts not by increasing the biliary excretion, but by its disinfecting properties, thus diminishing the abnormal irritation of the mucous membrane of the gall-bladder.—*Berliner klinische Wochenschrift*, 1894, No. 6, S. 132.

THE INJECTION IN PNEUMONIA AND TYPHOID FEVER OF SERUM FROM CONVALESCENTS.

DRS. W. E. HUGHES and W. S. CARTER present the result of the study of fourteen cases of pneumonia. The serum was obtained most frequently by venesection, occasionally by blistering. It was injected subcutaneously, the method having been found to be as efficacious and less dangerous and troublesome than intravenously. The amount used varied from five to twelve drachms. From a therapeutic standpoint the results were disappointing. In the ten cases where perfect serum was used there were three deaths; with the imperfect serum one in four died; this is about the usual death-rate. The injections, if carried out with proper precautions, are perfectly harmless. In none of the cases were any bad general effects noted. In two cases local inflammation followed the injection. However, serum should not be obtained from a case where there is any suspicion of kidney-lesion, for it has been found that serum drawn from victims of Bright's disease is capable, when introduced intravenously into dogs, of producing nephritis. Three cases of typhoid fever are reported. The serum was obtained by venesection from convalescents in whom somewhat less than two weeks had elapsed since the end of the fever. These cases were none of them especially grave, and would certainly have recovered in the natural course of events. If the serum had any immunizing effect it acted as would have been expected, not by producing any sudden fall of temperature, but by bringing on the gradual termination of the fever sooner than otherwise it would have occurred. In these cases the fever terminated on the twenty-second, eighteenth and twentieth days respectively, which is somewhat unusual for three consecutive cases. In spite, then, of the mild nature of the cases, and the somewhat irregular action

of the serum, they are inclined to the opinion that the serum had some effect. *Therapeutic Gazette*, 1894, No. 6, p. 365.

THE TREATMENT OF OBSTRUCTIVE ICTERUS.

DR. DUJARDIN-BEAUMETZ divides this condition into three classes with reference to its causation: 1. Obliteration from a calculus. 2. Obliteration from inflammation. 3. Obliteration from compression by tumors—the last belonging exclusively to the domain of surgery. Hepatic calculi are more frequent in women, and it is probable that the corset is an important factor in their causation, which is further aided by the usual costo-superior type of respiration. In these cases systematic massage can do much in relieving the causative factor. Of the cholagogues, the watery alcoholic extracts, as podophyllin, cascarrillin, and euonymin, and even sodium salicylate, can be of service. To these should be added alkalies, as the waters of Vichy or Vals. For the treatment of hepatic colic two agents have recently been introduced—oil and glycerin. The oil has been the subject of numerous papers, and has achieved considerable success, but it possesses the marked inconvenience of being repugnant to the patients, and they swallow with considerable difficulty, at one time, the large amount (seven ounces) which is required. Glycerin in much smaller quantity, two and one-half to five drachms, appears to be equally effective, either given clear or mixed with water. If the latter fails, then it is necessary to resort to anodyne suppositories, ether sprays over the hepatic region, hypodermatic injection of morphine and atropine, or even to chloroform if the pain is acute. The obliteration from inflammatory action, which is usually the consequence of a duodenitis, requires different treatment. The duodenitis may be the result of an excessive alimentation in quality and quantity, or an incomplete mastication. It is necessary to regulate and increase the number of the meals—for each meal, by giving rise to reflex phenomena, produces an increased flow of bile. Irritant foods must be avoided—those which increase the gastric acidity, especially alcohol and liquids containing it. In the advanced stages it is necessary to resort to intestinal antiseptics, of which the most in use are salol, benzonaphthol, and the salicylates. Salol, usually the best of all, is here unavailing, because the bile being arrested, the contents of the duodenum are acid, and no decomposition of the drug occurs. To obtain antiseptic effects from benzonaphthol one drachm or more each day is required. Of the salicylates, bismuth salicylate is the best. Since this colors the feces it is difficult to arrive at a true understanding of the patient's condition; to avoid this inconvenience asaprol has been substituted with advantage. Calomel is useful because it is at the same time a purgative and an antiseptic; but it should be used with caution if the treatment is to be prolonged. Constipation is always an important symptom, and the use of Rubinat, Carabana, Villacatras, and even Carlsbad is advisable. Pancreatin may be useful in some cases.—*Bull. général Thérapeutique*, 1894, 18e livr., p. 385.

THE DIETETIC TREATMENT OF PHTHISIS.

DR. HENRY P. LOOMIS formulates the following rules: 1. Never take cough mixtures if they can possibly be avoided. 2. Food should be taken at

least six times in the twenty-four hours; light repasts between the meals and on retiring. 3. Never eat when suffering from bodily or mental fatigue or nervous excitement. 4. Take a nap or at least lie down for twenty minutes before the mid-day and evening meals. 5. Take only a small amount of fluid with the meals. 6. The starches and sugars should be avoided, as also all indigestible articles of diet. 7. As far as possible each meal should consist of articles requiring about the same time to digest. 8. Only eat so much as can be easily and fully digested in the time allowed. 9. As long as possible systematic exercise should be taken to favor assimilation and excretion; when this is impossible, massage or passive exercise should be undergone. 10. The food must be nicely prepared and daintily served—made inviting in every way. He proposes the following as a diet-sheet in the early stage: On awakening, eight ounces of equal parts of milk and seltzer, taken slowly through half an hour. Breakfast: oatmeal and cracked wheat with a little sugar and an abundance of cream, rare steak or loin chop with fat, soft-boiled or poached egg, cream toast, half-pint of milk, small cup of coffee. Early lunch, half-pint of milk or small teacup of squeezed beef juice with stale bread. Mid-day meal: fish, broiled or stewed chicken, scraped meat ball, stale bread, and plenty of butter, baked apples and cream, two glasses of milk. Afternoon lunch: bottle of kumyss, raw scraped beef sandwich, or goblet of milk. Dinner: substantial meat or fish soup, rare roast beef or mutton, game, slice of stale bread, spinach, cauliflower, fresh vegetables in season (sparingly).—*The Practitioner*, 1894, No. 311, p. 321.

THE TREATMENT OF NOCTURNAL ENURESIS.

DR. DONALD MACALISTER, having first ascertained that no condition requiring surgical interference exists, uses atropine in doses gradually increased to the full limit of tolerance, and in no instance, out of some twenty cases, has failed to bring about a cure. He combines the atropine with strychnine, and increases the dose, which is given at 9 P. M., until one-tenth of a grain is reached. If it is necessary for the patient to use his eyes, a solution of eserine salicylate is instilled into the eyes, but the atropine is not discontinued. No fluids are allowed after 6 P. M.; the patient is awakened at 10 P. M., midnight, and 6 A. M., for the purpose of emptying the bladder. The secret of success lies in courageous overdosing; the addition of strychnine probably diminishes the depressant effects of large doses of atropine, and increases the sensitiveness of the vesical centres to reflexes from the bladder walls.—*The Practitioner*, 1894, No. 311, p. 331.

THE TREATMENT OF DIABETES.

DR. ADOLF MICHAELIS reports a single case in which he used sodium salicylate in the daily amount of from two to two and one-half drachms. After two months' use of this remedy symptoms of intoxication appeared, which ceased after a few days. During this time, although there were no especial errors or excesses in diet, the sugar continued to be excreted, in spite of the fact that ordinarily the remedy was well borne.

DR. LENNÉ has treated a patient with the fluid extract of *syzygium jam-*

bolanum cortex, which he has used in the dose of four drachms in water one or two hours after meals thrice daily. Observation during nearly a month showed only such variations in the amount of urine, specific gravity, percentage of sugar and of urea as are usually seen when no medication is carried out. He concludes that this preparation has just as little influence upon sugar excretion as he had formerly found the powdered fruit to possess.—*Therapeutische Monatshefte*, 1894, Heft 5, S. 204.

MEDICINE.

UNDER THE CHARGE OF

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APEX DIASTOLIC BRUIT IN HEART DISEASE OF CHILDREN.

THEODORE FISHER (Bristol) draws attention to the occurrence of this murmur in cases of adherent pericardium with dilatation and hypertrophy. In 13 cases occurring in the Guy's post-mortem records, in 5 a diastolic or a presystolic bruit had been present during life, and in every case the mitral orifice was dilated and the aortic valves free from thickening.

The writer rejects the view that it is due to relative contraction of the orifice owing to the large size of the cavity. In some of the cases a *systolic* thrill is also present.

"Dr. Cheadle has noticed the frequency of a diastolic sound in the early endocarditis of children, and states that, although it may disappear, it generally develops into the presystolic *bruit* of mitral stenosis.

"Possibly the diastolic sound that disappears, although indistinguishable at this stage from that of early mitral stenosis, may indicate temporary dilatation of the heart. The sound heard in the diastolic interval in association with a dilated heart may be either a sound separated by an interval both from the second or the first sound, or it may be a low-pitched presystolic rumble. As is well known, the presystolic *bruit* of mitral stenosis may often be replaced by a diastolic sound. The soft presystolic rumble of a dilated heart may also alternate with a diastolic sound.

"The presystolic rumble of a dilated heart is, however, probably too low pitched to lead to much difficulty in diagnosis, and, when changed for a

diastolic sound, the accentuation and rhythm may be that of the *bruit de galop*. There is, however, a diastolic murmur heard in the dilated heart of children which is presumably due to that dilatation, and is indistinguishable from the diastolic sound of mitral stenosis. It may be best heard at the impulse or just outside it, or over the right ventricle in the third and fourth or fourth and fifth intercostal spaces. In one position it is probably produced in the left ventricle, in the other in the right. In the same heart it may sometimes be best heard in one position, sometimes in the other, and then probably points to general dilatation.

"Whether such a murmur indicates mitral stenosis or dilatation of the heart is of some importance. Adherent pericardium is the most common cause of a dilated heart in childhood, and death from such a cause is far more common than from mitral stenosis. Thus the post-mortem reports at Guy's for seven years showed that there were only 3 deaths from mitral stenosis of the age of fifteen years and under, while there were 13 deaths from cardiac disease with adherent pericardium, in which valvular disease was either absent or there was merely slight thickening of the mitral valves. Apparently very few children with adherent pericardium survive the age of fifteen, while mitral stenosis is not uncommon in young adults. This suggests that the immediate prognosis is considerably worse in the former affection. A diastolic sound, therefore, indicating persistent dilatation of the heart, is probably of far more serious import than one pointing to mitral stenosis."—*British Medical Journal*, 1894, No. 1739.

SUDDEN INSENSIBILITY AFTER EXTREME MUSCULAR EXERTION.

POORE (London) records the following case (*Lancet*, 1894, No. 3687): A strongly built man, aged twenty-one, was admitted to University College Hospital in an unconscious and irritable condition on February 25th. He had travelled to London, 120 miles, on the previous day to run in a ten-mile race, for which he had been training for some time. He felt out of sorts when the race began, but did a good time of 66½ minutes across very heavy country. During the race he did not perspire as much as he ought to have done, and afterward when he went to the dressing-room he felt very thirsty and drank off about a pint and a half of cold water. After this he became ill, did not recollect dressing himself, and, in fact, remembered nothing more until he found himself in the hospital next evening. His friends state that the race was finished about 5.45 P.M., and after this the patient dressed himself with very little assistance, but he did not seem well; he appeared "over-run." Just after leaving the dressing-room with his friends he "fainted." They gave him some brandy, but, as he became unconscious and helpless, they carried him to a neighboring house and laid him down on the floor. Here he lay quite still, with semi-closed eyes, occasionally groaning as though in pain. His breathing was stertorous, and his pupils are said to have been dilated equally and his teeth clenched. He continued thus until 7 P.M., when he began to have convulsions, which appear to have been epileptiform in character. They came on with intervals of one or two minutes, in which the breathing was stertorous and the patient was quite quiet. A considerable quantity of saliva ran from his mouth, but he did not bite his

tongue. At 8 P.M. the convulsions became so violent that it was found necessary to restrain the patient, and at 11 P.M. he was given a hypodermatic injection of morphine. This controlled the fits, and he lay quiet during the rest of the night, but was quite unconscious. All next day, February 25th, he remained in the same condition, and in the evening was brought up to hospital. On admission he was in a state of extreme cerebral irritation. The pupils were equal and semi-dilated; the breath foul; the man would not answer questions or put out his tongue; the pulse was regular, full, and bounding; the urine normal. Attempts to feed by the nasal tube had to be given up on account of the violence of the patient. He then sat up in bed, seemed quite rational, drank a pint and a half of milk, and took three grains of calomel. He was restless, but quite conscious during the night. There was some headache on the following day, and the patient left the hospital on March 4th, no bad symptoms having developed in the interval.

In his remarks on the case, Poore considers as probable factors in the causation, waste products circulating in the blood, hyperpyrexia from suspension of sweating, and possibly sudden cerebral anæmia from drinking a large quantity of cold water after the race.

DIPHTHERIA OF THE GENITALS FOLLOWED BY PARALYSIS.

GAYTON (London) mentions the case of a well-nourished girl of four years admitted to hospital with membranous diphtheria of the pudendum and groins. There was slight albuminuria and no fever. After three weeks the local condition was healed, but the albuminuria persisted. A week later strabismus was noted, and in the course of a few days paralysis became almost universal and eventuated in death by asphyxia. There had never at any time been any affection of the fauces or naso-pharynx. It is noted that out of 2733 cases which have come under observation, in only 6 were the genitalia affected.—*Lancet*, 1894, No. 3691.

THE PATHOGENESIS AND TREATMENT OF THE DELIRIUM OF PNEUMONIA.

At the Eleventh International Medical Congress recently held at Rome, ROBERT (*Le Mercredi Médical*, 1894, No. 19, p. 230) dilated upon the gravity of the delirium of pneumonia, especially by reason of its inhibitory influence upon the tracheo-bronchial reflex centre, which, it has been demonstrated, is situated in the dorso-lateral portion of the pneumogastric centre. It was pointed out that the cerebral disturbances that appear in the course of an attack of pneumonia do not have a common pathogenesis. The most rational explanation is to be found in the action of various toxins or toxalbumins. The delirium that occurs during the period of engorgement and red hepatization is probably due to hyperæmia of the cerebral membranes; that occurring during the period of gray hepatization, to the meningeal complications resulting from secondary infection; that occurring during the period of defervescence, to cerebral anæmia or perhaps to passive congestion. The delirium of active cerebral hyperæmia is characterized by great agitation and marked insomnia; the face is red, the sclerotics injected, the pupils contracted, the pulse as a rule frequent and strong. Therapeutically, anti-

pyretics, cerebral derivatives, and bleeding are indicated. In case of passive hyperæmia, the condition is one of tranquillity and incoherence alternating with periods of somnolence; the general state is rather typhoid. Cardiac and cerebral stimulants are indicated. In case of cerebral anæmia the delirium is of reasoning character, the patient being loquacious in alternation with hallucinations of agreeable or frightful character. Opium, alcohol, and sedatives will be required.

HYSTERICAL DEAFNESS.

AT a recent meeting of the French Society of Otology and Laryngology, CARTAZ (*La Médecine Moderne*, 1894, No. 37, p. 583) discussed the auditory manifestations of hysteria and took the ground that the rarity of their occurrence is apparent rather than real. Deafness, however, in association or not with other profound evidences of hysteria, such as mutism and ocular derangement, he admitted to be exceedingly uncommon. Fifteen cases of hysterical deafness have been collected, and Cartaz reported two additional ones. One occurred in a girl of sixteen who, when she came under observation, had been deaf and mute for two days. She had menstruated for two years, the periods having been irregular at first; from time to time at the menstrual periods she appeared apathetic and with a disposition to weep without obvious cause. Two days before coming under observation, in the course of a heated discussion with a companion she received a slap in the face. She appeared for the moment stunned, but at once broke into tears. Her mother spoke to her, but received no response. The girl made movements with her lips, as if she wished to speak, but did not succeed in enunciating any words. She seemed not to understand what was said to her. The treatment consisted in the application of the constant current, sometimes only by suggestion, sometimes actually, and recovery soon ensued. The second case presented an even more rare association than the first. In this there was both blindness and deafness of hysterical origin, which readily disappeared under the influence of magnetism.

TWO CASES OF HEREDITARY CHOREA IN TWINS.

RUSSELL (*Birmingham Medical Review*, vol. xxxv., No. 185, p. 31) reports the case of a man, thirty-four years old, who presented marked choreiform movements of the face, trunk, and limbs of seven years' duration. In addition to many extremely irregular movements, especially of the trunk and arms, there was a decided tendency toward the constant repetition of a few more definite actions. This was more marked in the face, the right angle of the mouth being drawn up every few minutes to its extreme limits, and the orbicularis palpebrarum contracting at the same time. There was a tendency to throw the arms for a moment into a position of rigid extension before any voluntary movement could be carried out. The legs also tended to become rigid in walking, giving an almost spastic character to the gait. Most of the movements continued to a certain extent during rest; they ceased, however, during sleep. The knee-jerks were exaggerated and slight ankle-clonus could usually though not invariably be elicited. The electric reactions were practically normal. There was no difficulty in micturition or in defecation. The

optic disks and the heart were unaffected. The mental condition appeared to be a little impaired. A twin brother of the patient presented similar symptoms, which had appeared a little earlier than in the case of the latter. In this case the legs are said to have been affected first. During rest the only movement observed was a frequent throwing back of the head and retraction of both corners of the mouth. The gait was spastic, the reflexes greatly exaggerated; ankle-clonus was easily elicited. The mental condition was good. The father of these two brothers had suffered from gradually increasing chorea for the last nine years of his life, and died in a condition similar to that presented by the children. Another brother is said to have suffered from a slight and temporary attack of chorea at the age of twenty-three years. Three sisters and two other brothers were quite healthy. [One cannot read the history of the two cases here detailed without having brought to mind the clinical picture of spastic hemiplegia of cerebral origin.]

THE BLOOD IN A CASE OF RAPIDLY FATAL PERNICIOUS ANÆMIA.

ASKANAZY (*Zeitschr. f. klin. Med.*, vol. xxii.; *Provincial Med. Journ.*, vol. xiii., No. 146, p. 101) has reported the results of a microscopic examination of the blood in a case of rapidly fatal pernicious anæmia. In addition to numerous morphologic abnormalities among the erythrocytes there was observed among many of these a deviation from their usual tinctorial properties, which has been designated anæmic degeneration; thus many of the erythrocytes assumed under the influence of Ehrlich's mixture a reddish-yellow or glittering, rosy hue, whilst with Plehn's solution or hæmatoxylin-eosin, they stained a distinct violet, and in addition to this frequently exhibited a very fine blue-black granulation. A large number of nucleated red corpuscles were found in addition to the anuclear forms, and the megaloblasts exceeded the normoblasts and presented peculiarities as to staining. It was also observed that the nucleus of many of the normoblasts did not present the usual circular shape; this was sometimes polymorphous and sometimes accompanied by accessory nuclei. In many instances, in addition to a rosette-shaped principal nucleus, the whole body of the cell was strewn with coarser and finer chromatin corpuscles; in other similarly shaped cells a principal nucleus could not be detected. This peculiar behavior of the nuclei is designated karyolysis, a metamorphosis of the nucleated red corpuscles into the non-nucleated, fully developed forms. Karyokinesis of the red blood-cells was also observed. Mitoses were detected and "fixed" in various stages, and in one fresh, unstained preparation the whole process was observed from beginning to end in one red blood-cell.

TWO UNUSUAL CASES OF PYREXIA.

SHORT (*Birmingham Medical Review*, vol. xxxv., No. 185, p. 27) has reported a case of anæmia attended with hyperpyrexia, and a case of enteric fever complicated by ague. The first case occurred in a female, twenty-eight years old, who came under observation on account of weakness. She was extremely anæmic, slept badly, and was not taking food well. For twenty-four hours the temperature ranged between 98° and 99°, but on the following

day it rose to 102°, falling the next morning to normal. The day after this it rose again and continued rising during the next twenty-four hours, until it reached 102.4°, when there occurred a distinct rigor. Five grains of quinine were now administered and the temperature fell to normal during the succeeding twenty-four hours, and sweating took place. During the following two weeks the temperature pursued an irregular course, rising to over 102° within every twelve hours, and usually subsiding to about 99° after the exhibition of quinine. On two occasions it rose to 104° and 106° despite the administration of large doses of quinine. The elevation of temperature was sometimes attended with rigors and sometimes not. Throughout the whole period of observation there was no enlargement of the spleen, no external evidence of pus, and no sign or symptom of tuberculosis. There was no reason to believe that enteric fever existed. Hysteria was excluded and special care was taken to exclude the possibility of deception. Under treatment with iron, in addition to the quinine, recovery ensued.

The second case occurred in a man, twenty-nine years old, who came under observation on about the fourteenth day of an attack of enteric fever, and seven days later had a rigor, with a rise of temperature to 104°, followed by profuse sweating and a decline of the temperature to 95.4°. On the following day the temperature again rose, to fall subsequently. On the next day a rigor occurred and was followed by a decline of the temperature to 95.6°. On the fourth day the enteric fever seemed to resume its ordinary course and uninterrupted recovery thereafter ensued. [In both of these cases the diagnosis would have been greatly strengthened by an examination of the blood for the presence of malarial plasmodia, and in the first such an examination would have disclosed the grade and character of the anæmia.]

BLACK TONGUE.

CIANGLINSKI and HEWELKE (*Zeitschr. f. klin. Med.*, vol. xxii., No. 6; *Provincial Med. Journ.*, vol. xiii., No. 146, p. 101) give a *résumé* of the literature of the condition known as black tongue, and detail a case that came under their own observation. They describe the condition as a spotted, black discoloration of those parts of the tongue lying anterior to the circumvallate papillæ. The etiology is for the most part obscure, though various disorders of the digestive apparatus doubtless play a part in it. The course of the affection is variable, the discoloration in some instances disappearing rapidly, while in others a considerable time elapses before the deposit upon the tongue is cast off by desquamation. There is as yet no unanimity of opinion as to the pathogenesis, although the majority of authorities consider it to consist in a hyperkeratosis of the circumvallate papillæ, viewing the parasites that have been described in this connection as merely accessories. In the case detailed the whole of the tongue of a young woman as far as the boundary of the circumvallate papillæ suddenly became discolored in such a manner that it appeared to have received a coat of blacking. On treatment with borax this discoloration disappeared, and microscopic examination showed that it was due to the presence of hyphomycetes, which were capable of being cultivated at a low temperature in proper media, and it was observed that portions of

the zygosporcs were thickened and blackened, whence the discoloration of the tongue. In other respects the fungus was like *mucor rhizopodiformis*, except that it was not pathogenic for rabbits. The mildness of the complaint is explained by the fact that the fungus develops very poorly at the normal bodily temperature; indeed it was observed that as soon as the patient ceased to breathe through her mouth, the temperature of the latter was sufficient to destroy the mucor. [It is possible that black tongue is due to various causes. At any rate a blackish discoloration of the teeth will be found in many if not in all cases.]

PSEUDO-HYPERTROPHIC PARALYSIS IN TWO BROTHERS.

RAM NARAIN (*Indian Medical Record*, vol. vi., No. 9, p. 272) has reported two cases of pseudo-hypertrophic paralysis in brothers, one seventeen, the other seven, years of age. In the latter the disease had been noticed for six months. At first the boy was clumsy in his movements, falling easily, and stumbling in ascending the stairs. Next, weakness of the lower extremities and difficulty in walking, together with a peculiar gait and attitude, were observed, and the muscles of the calves presented a nodular feeling. In standing, the legs were held far apart. The lad was unable to arise from the floor without assistance, and when a little help was given him he would raise himself up by placing his hands on his knees and then grasp his thighs a little higher till he pushed the body up. The patellar reflexes had disappeared, and a hollow in the back was beginning to make its appearance. In the elder boy the first symptoms of the disease were observed at the age of seven, just in the same way as in the younger. The onset, too, was gradual. His condition had become pitiable. He was quite helpless and entirely without power in the lower extremities, as well as in the muscles of the back. If, when made to sit up, his balance was disturbed, he would fall on his face and be unable to raise himself to the erect posture. Wasting had made its appearance in the muscles of the shoulder and back, while those of the calves had remained enlarged; the feet were clubbed. The reflexes were totally gone. Respiration, circulation, and digestion were not impaired, and general and special sensibility was perfect. Control of rectum and bladder was retained. Other than a little deficiency of the intellect, which had been present from the first, the mind was clear. The mother of the brothers was subject to attacks of rheumatism. A sister had died of sun-stroke at the age of eight years. No other neuropathic family history could be obtained.

MALTA FEVER.

HUGHES (*Sur une Forme de Fièvre fréquente sur les Côtes de la Méditerranée*; reprint [no date] from *Annales de l'Institut Pasteur*) has studied clinically and bacteriologically the peculiar fever encountered at Malta and other Mediterranean ports. It resembles in some respects typhoid fever, in some respects malarial fever. It is nevertheless a distinct affection, and a peculiar microbe, differing from Eberth's bacillus, is found associated with it; while both the latter organism and the plasmodium of Laveran are absent. The temperature is irregular. There are periods of fever of remittent type, lasting one

or two weeks, and separated by apyretic intervals of two or three days. In grave cases the temperature is continuous, and death may occur in hyperpyrexia. In obstinate cases fever may last six months or more. It is unaffected by quinine or arsenic. There is obstinate constipation, anemia, and progressive debility. Neuralgic and rheumatoid complications or sequelæ may be prolonged for two years. Immunity from typhoid fever is not given by Mediterranean fever or from the latter by typhoid fever. The mortality is about two per cent. The mean duration of stay in hospital is seventy to ninety days. The spleen is at first soft and enlarged. About the fifth or sixth week it becomes hard, and thereafter gradually shrinks to normal dimensions. The alimentary tract exhibits irregular patches of congestion, but Peyer's patches remain intact. The mesenteric glands are enlarged, but to a less degree than in enteric fever. Grave cases exhibit bronchitis or broncho-pneumonia. The *micrococcus Melitensis* is to be recognized morphologically and by culture. It has been found in the organs eight times by Bruce, in 2 cases by Gipps, and in 11 cases by the author—twenty-one in all. Bruce in 2 cases and the author in 4 cases, reproduced the disease in monkeys by inoculation of pure cultures of the micrococcus *Melitensis*.

SURGERY.

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APPENDICITIS, WITH ESPECIAL REFERENCE TO ITS TREATMENT.

J. WILLIAM WHITE, in an address on appendicitis, delivered before the Surgical Section of the College of Physicians of Philadelphia (*Therapeutic Gazette*, 1894, vol. xviii., No. 6) reviewed many of the important points relating to the cause, course, and diagnosis of appendicitis, and more especially to its treatment, about which great differences of opinion still exist in the profession.

These differences of opinion, it is remarked, are extraordinary, in view of the very frequent occurrence of the disease, and the large opportunity thereby offered for its careful study. A closer consideration of the subject must gradually tend to bring surgeons and physicians to a common ground.

The etiology is considered under (*a*) predisposing and (*b*) exciting causes. Among the predisposing causes mentioned are the low vitality and feeble resistance that characterize organs which in the process of evolution have

become functionless vestiges. In addition, the dependent position of the appendix, and its communication with that portion of the intestinal canal where inspissation of the contents first occurs, while at the same time it is removed from the direct fecal current, predispose to inflammatory attacks. The exciting causes are in the vast majority of cases either mechanical or bacterial (infective), the latter usually, perhaps, constantly being a sequel of the former, while it may be the *fons et origo* of the disease. In addition, tubercular or other general disease is, in rare instances, the source of appendiceal trouble.

The anatomical relations of the appendix are interesting in this connection. The process is usually curved upon itself on account of the shortness of the mesentery. Along the free border of the mesentery runs a small artery, which is the only source of blood-supply to the appendix. Distention of the ileum with gas, or of the head of the colon with gas or fecal matter, causes tension of the mesentery of the vermiform process with increased torsion of of the latter. This interferes with the blood-supply through the single vessel and, according to the degree of this interference, produces congestion and tumefaction, catarrhal inflammation, or ulceration or gangrene.

The bacterium *coli commune* is very constantly associated with appendicitis. This micro-organism is present in the alimentary tract in health, and becomes pathogenic and pyogenic when for any reason the integrity of the intestinal walls is lost. Thus, even a moderate constriction of the intestinal canal may enable the bacterium to penetrate its walls, while the virulency is much increased by any abnormal state, as diarrhoea or constipation.

It is now known that foreign bodies are very rarely the cause of appendicitis. The study of a large number of cases shows that not more than 4 per cent. of the cases are so produced. Fecal concretions have been found in 15 to 20 per cent. of the cases, and although they may in some instances be the cause of lesions of the mucous membrane which permit of bacterial invasion, they perhaps infrequently bear an etiological relation to the disease in question.

The comparative immunity of the female to this disease (women are affected only one-fourth or one-fifth as frequently as men) is explained by an additional blood-supply to the appendix through the appendiculo-ovarian ligament.

The usual symptoms of a mild attack of the catarrhal type are *pain*, at first diffuse, affecting the abdomen generally, and later localized entirely to the right iliac fossa, *localized tenderness*, most frequently at McBurney's point, *vomiting*, *moderate fever*, (99.5° to 101° F.), *increased pulse-rate* (90-110), and *rigidity of the right rectus muscle*.

The diagnosis must be made chiefly from stercoral typhlitis. The presence of a tumor at the very beginning of an attack of apparent appendicitis of mild type is the only symptom which can be considered as at all pointing to the latter condition. In doubtful cases it will be safer to consider the trouble appendicitis.

The treatment advised for a mild catarrhal case is as follows: *Absolute rest* should, of course, be enforced. *Starvation*; it is desirable in the acute attack that the patient should be given nothing but an occasional sip of water. The frequent inability of the stomach to retain food, and the certain inability of a portion of the intestinal tract to take care of the residue as well as the abso-

lute necessity of avoiding all sources of local irritation, abundantly justify this recommendation. The local use of *heat* and *cold*, and local *depletion* by means of leeches have about equal claims for employment. A preference is expressed, however, for heat or bloodletting. Objection is made to the use of blisters, iodine, and the various ointments, as they render the skin more or less unsuitable for operation, if this measure should become necessary. The author expresses the opinion that not enough attention has been paid to the "antiseptic" treatment of appendicitis.

If, at the end of forty-eight hours, or earlier, there is *severe, sharp* pain, increased tenderness and rigidity of the abdomen, and beginning tympany, either local or general, surgical interference offers by far the best chance for recovery. In the majority of the cases presenting these phenomena a perforation of the appendix wall has taken place, sufficient at least to permit of the passage of bacteria or their products. A case having reached this stage need not necessarily terminate fatally, but "there is absolutely no way of recognizing with any reasonable certainty which of these three events will follow: resolution and recovery; localized abscess, with from 90 to 95 per cent. of chances in the patient's favor; or general peritonitis with almost sure death if it is once well established." Hence the advice to interfere surgically.

Operation at this stage is usually easy. The incision should be two or three inches in length, placed obliquely with its centre a little outside of McBurney's point. In removing the appendix, when possible, a peritoneal flap should be reflected, the mucous coat ligated with a circular ligature, the cut extremity touched with pure carbolic acid, the flap of peritoneum brought over the end, and closed with Lembert sutures. When the peritoneum has become thickened and brittle, the whole thickness of the appendix may be included in the ligature, and the stump cauterized with pure carbolic acid.

Drainage will rarely be necessary, and the danger of ventral hernia following is very remote.

In the event of operation being refused by the patient or the medical attendant, Dr. White has been led to await events with more equanimity—1. If the bowels are loose; 2. If the pain is dull and throbbing, rather than sharp and lancinating; 3. If the spot of greatest tenderness is not precisely at McBurney's point; 4. If vomiting is not marked; and 5. If, without marked change in the general condition, increased resistance, slight dulness, and the presence of a mass recognizable by palpation indicate that a localized abscess is forming, shut off by adhesions from the general peritoneal cavity.

The period between the third and sixth days, if the symptoms do not ameliorate, is one of great anxiety, and the outcome very uncertain. As a rule, it is not a favorable time for operation, but the patient must be under close observation and operative measures employed if the indication arises.

Attention is called to the distinction between the conditions present in "chronic" and in "relapsing" appendicitis, and to the necessity of separating them in practice.

In conclusion, the author presents the following summary of his views on this subject:

1. The explanation of the great frequency of inflammation of the appendix is to be found in the following facts:

(a) It is a functionless structure of low vitality, removed from the direct fecal current; it has a scanty mesentery so attached to both cæcum and ileum that it is easily stretched or twisted when they become distended; it derives its blood-supply through a single vessel, the calibre of which is seriously interfered with or altogether occluded by anything which produces dragging upon the mesentery.

(b) In addition, there is almost always present a micro-organism—the *bacterium coli commune*—capable of great virulence when there is constriction of the appendix or lesions of its mucous coat or of its parietes.

2. The symptoms in a case of mild catarrhal appendicitis—general abdominal pain, umbilical pain, localized pain and tenderness on pressure in the right iliac fossa, vomiting, moderate fever, and slightly increased pulse-rate—cannot at present with any certainty be distinguished from the symptoms, apparently precisely identical, which mark the onset of a case destined to be of the very gravest type.

3. It must be determined by future experience whether or not operation in every case of appendicitis, as soon as the diagnosis is made, would be attended by a lower mortality than would waiting for more definite symptoms indicating unmistakably the need of operative interference. At present such indication exists in every case if the onset is sudden and the symptoms markedly severe, and whenever in a mild case the symptoms are unrelieved at the end of forty-eight hours, or, *a fortiori*, if at that time they are growing worse.

4. It must be determined by future experience whether cases seen from the third to the sixth day, which present indications of the beginning circumscription of the disease by adhesions, and which tend to the formation of localized abscesses, will do better with immediate operation with the risk of infecting the general peritoneal cavity, or with later operation when the circumscribing wall is stronger and less likely to be broken through. At present, operation is certainly indicated whenever a firm, slowly forming, well-defined mass in the right iliac fossa is to be felt; or, on the other hand, when a sudden increase in the sharpness and the diffusion of the pain and tenderness points to perforation of the appendix or breaking down of the limiting adhesions.

5. In the beginning of general suppurative peritonitis, operation offers some hope of success. In the presence of general peritonitis with septic paresis of the intestines, operation has thus far been useless.

6. Recurrent appendicitis of mild type, like acute appendicitis, frequently results from digestive derangements. Several attacks may occur followed by entire and permanent recovery, but it is as yet impossible to differentiate these cases accurately from those which do not tend to spontaneous cure. Operation is certainly indicated whenever the attacks are very frequent.

7. Chronic relapsing appendicitis is characterized by the persistence of local symptoms during the intervals and by more or less failure of the general health. Operation is usually indicated.

8. In either the recurrent or the chronic relapsing variety operation should be advised according to the following indications formulated by Treves: whenever (a) the attacks have been very numerous. (b) The attacks are increasing in frequency and severity. (c) The last attack has been so severe as to place the patient's life in considerable danger. (d) The constant

relapses have reduced the patient to the condition of a chronic invalid, and have rendered him unfit to follow any occupation. (e) Owing to the persistence of certain local symptoms during the quiescent period, there is a probability that a collection of pus exists in or about the appendix.

ON SYNOVIAL TUBERCULOSIS IN HUMAN JOINTS, FROM THE
PATHOLOGICO-ANATOMICAL POINT OF VIEW.

KOENIG (*Centralblatt für Chirurgie*, 1894, No. 22), from a study of about 300 specimens of synovial tuberculosis, obtained either by resection or amputation, from the collection of the surgical clinic in Göttingen, arrives at the following conclusions:

1. Synovial tuberculosis is produced either from a focus of disease in the bone opening into the joint, or from a deposit in the synovial sac without such pre-existing focus—a hæmatogenous synovial tuberculosis. Accordingly, there is a variety affecting the bone primarily and the synovial membrane secondarily, and the primary synovial form. They begin with a sero-fibrinous exudation; this is not a special form of synovial tuberculosis, but is the first declaration of the disease.

2. This form of the disease may undergo resolution without leaving any pronounced change in the affected joint. More frequently the process goes further, the fibrin is partly deposited free in the synovial liquid in all forms, of the disease, but the greatest portion remains adherent to the synovial membrane and to portions of the cartilaginous surfaces, and in still greater quantity in certain points. It increases by the formation of successive layers; this undergoes a form of organization which becomes more pronounced as the layers increase. This organization takes place by vessels from the synovial membrane extending into the fibrinous layers. In those collections which appear on the cartilages, the vessels come from the border of the insertion of the synovial membrane. Following the appearance of the vessels a deposit of cells takes place; round-cell masses with giant cells are early observed. The extent of this change and the amount of the new formation determines the character of the tissue, whether fungous, cheesy, granulating, fibrinous, or puriform collections, while the interference with motion and the pressure depend upon the masses of lymph deposited (agglomeration in masses; smooth, superficial deposit on the free surfaces of the joints; the formation of tongues, polypoid attachments, the formation of rice-like bodies, etc.).

So long as the disease is progressive one finds on the surface of the organized formations a layer of unorganized fibrinous deposit. The newly formed tissue, and not the degenerated synovial membrane, forms the fungous or granulating swellings and fibroid new formations, and also the tubercles are found principally here, the cartilage and bone being involved secondarily.

3. In this tissue occur the changes which result either in the destruction or the cure of the joint. The destruction first affects the joint surfaces wherever the layers have formed and organized. The fibrinous deposits later become changed into granulation tissue. Microscopic study shows that in the destructive process the cartilage is at first passive, and is destroyed by the granulations. It is not at all necessary that the overlying granula-

tions contain tubercles, because entirely similar conditions occur after hemorrhage into a joint, in which the fibrin of the blood is deposited on the cartilaginous surfaces and organizes. After the cartilage is destroyed the bone is attacked, and this takes place, as a rule, in certain typical places, sometimes forming defects which, on account of their size and round form, look not unlike primary osteal deposits. Our whole teaching of the existence and frequency of primary osteal tubercle must be revised in view of these investigations. The number of such cases is certainly smaller than was formerly supposed. Not only is the bone and cartilage destroyed from processes beginning within the joint, but an osteomalacia affects the subchondral ends of the shaft of the bone, and the resulting granulations lift the cartilage from the bone. This granulating osteitis is not, as a rule, tuberculous, but it is prone to coexist therewith. Finally, it is pointed out that the cure of the tuberculous joint is effected through shrinking and cicatrization of the organized fibrin.

A NEW METHOD OF RADICAL OPERATION IN LARGE UMBILICAL HERNIÆ.

GERSUNY has devised the following operative technique for cases of umbilical hernia, in order to guard against a recurrence (*Centralblatt für Chirurgie*, 1893, No. 43). After making the necessary incision, the sac is freed on every side by blunt dissection, then opened, the omentum is ligated, and the stumps with any coils of intestine returned. The sac is then cut off, and the peritoneum sutured on a level with the bottom of the wound. One next looks for the recti, the median borders of the sheaths of which are then opened with scissors. Several arteries will need ligation.

Button sutures are used to approximate the abdominal wound, first having used sutures for the peritoneum alone. The sutures are entered quite near the wound margin, to prevent inversion of the skin, and as the needle reaches the muscle a greater thickness is taken in order to bring the margins of the muscle together, when the sutures are tied, or the edges may even overlap. To prevent the formation of a pocket, Billroth's method is employed. This consists in including the sutured margins of peritoneum in every second suture of the abdominal wall. By this method the fibrous linea alba is eliminated.

THE RESTORATION OF THE PENILE URETHRA IN PATIENTS WITH STRICTURE.

LAVAUX (*Chir. Contemp. des Org. Génito-urin.*, February, 1894) reports a case of chronic urethritis with stricture, followed by urinary infiltration, and the formation of an abscess that extended from the balano-preputial junction distally, to the scrotal region, separating the aponeurosis from the spongy portion of the urethra, and forming a urethral fistula by opening externally. He found, after enlarging the fistula by an incision in the median line, that the urethra was destroyed with the exception of the quarter forming the roof for a great distance, about two centimetres remaining of the glandular portion. Although this portion would admit a No. 18 sound, the urine passed slowly. This was accounted for by a peduncle tumor the size of a pea, that acted

as a valve in its proximal orifice. The incision was extended to the scrotal region, where the urethra was again found; it would only admit a No. 8 French sound. After resection of the strictured portion the largest possible catheter, No. 15 French, was passed through a stricture in the prostatic urethra, and a new floor for the urethra formed by uniting one flap of the fascia of the penis to the base of the other over the catheter by means of catgut sutures. The external wound was freshened, and then closed by silk-worm-gut sutures. In spite of numerous erections, through careful local antisepsis the upper two-thirds of the wound and the abscess cavities healed by primary union, and there remained finally only a small fistula situated well forward, which could be easily closed by a second plastic operation.

The author concludes that where interference is strongly indicated, we should not hesitate to resect the urethra in the scrotal or penile portions, and follow it up by restoring the urethra, which will bring good results if strict local antisepsis is employed, and erections are prevented or lessened in number.

The thinness of the peri-urethral tissues in the penile portion of the urethra does not contra-indicate resection of traumatic strictures of small extent. The erections may be prevented by preliminary dilatation or use of the catheter and sounds in the prostatic urethra, lessening the irritability; by removing the catheter after the operation as soon as possible; by the avoidance of irritating antiseptics in the urethra. He advises the use of saturated and boiled solutions of boric acid or supersaturated solution of the same.

ON THE EXTIRPATION OF GOITRE.

WOLFF, in an article upon this subject (*Deutsche med. Wochenschrift*, 1893, No. 11), calls attention especially to three points:

1. The causes of death during or immediately after operations for the relief of goitre.
2. The later behavior of the portion of goitre which remains in cases of unilateral extirpation.
3. The use of methodical wound-compression in intracapsular extirpation of goitre.

With reference to the first of these, Wolff thinks the quantities of mucus that are raised from the stomach by the retching induced by the anæsthetic are frequently the cause of the sudden death. He mentions several cases, collected from literature, which he explains in this way. The treatment advised is to allow the head to hang down, and to wash out the throat with water. The reason the same accident does not occur during operations for other conditions is explained, the author believes, by the fact that in goitre the air-passage is narrowed until it resembles the sheath of a sword, while with normal air-passages no trouble would be experienced. After a considerable experience with removal of one-half of a goitre, Wolff has not observed any hypertrophy of the remaining portion, but, on the other hand, there is usually more or less diminution in its size. Nevertheless it is possible that after a transient reduction of the remaining portion of the goitre a recurrence may take place. Four such cases are mentioned. The relation between the narrowing of the air-passages is thought to be as follows: The goitre first

produces the narrowing, and then this causes further enlargement of the goitre. The lumen of the air-passage is diminished by the capsule of the gland growing intimately to it, and strangling it like a broad band. The growth of the gland, which depends upon the narrowing of the air-passage, can be arrested only by carefully removing the constricting band—that is, by separation of the capsule of the gland from the trachea. The more fully the air-passage is freed by thoroughly relieving the constricting band, the more securely the patient is assured freedom from increase in the size of the remaining portion and from recurrence.

Wolff concludes that the intracapsular enucleation is to be preferred, because the method is much safer than any other, because additional lesions, with their serious consequences, are much less apt to occur, and the difficulties in the technique are much reduced.

THE FINAL RESULTS IN TWO HUNDRED OPERATIONS FOR GOITRE.

SULZER (*Deutsche Zeitschr. für Chir.*, Bd. xxxvi. p. 193) reviews the cases occurring in the Canto Hospital in Münsterlingen, during the years 1868–1892. There were 55 male and 145 female patients, and 50 per cent. were between the ages of 15 and 30, or the period of development of the sexual functions. The majority sought relief from dyspnœa and not from dysphagia. The method by extirpation as advocated by Kocher was employed 44 times, 6 total and 38 partial extirpations. Marked softening of the trachea was never seen. Two cases had to have tracheotomy performed during and two after the operation, one of the former alone surviving. The author believes that the septic pneumonia which occurred in certain cases was caused by infection through the blood and not by inhalation. Cachexia thyropriva was observed in a boy twelve and one-half years old, but the symptoms passed away after a slight relapse. Tetanus was never seen. The author prefers to cut down to the capsule, which has a small arterial supply, before beginning to enucleate. Bleeding should be controlled by a firm silk interrupted suture. Bloodless operating may be secured by using the elastic tourniquet, as described by Bose, though it is not without danger, as it may drag upon the recurrent laryngeal nerve and produce dyspnœa. The use of all drainage has been abandoned in the last 32 cases without any harmful effect. In 83 cases primary union followed the operation. Three cases operated upon had Basedow's disease. In one case, after excision of the isthmus, a cure with only slight exophthalmus followed, which has lasted twelve years. A second case was improved, while the third was uninfluenced by the operation. In 10 cases of malignant tumors the results were not as good; 3 died in the hospital after the operation; 6 left with their wounds healed, but 3 of them had relapses later. In one case of especial interest portions of the œsophagus and trachea had to be removed. The wound of the œsophagus did not heal for some time, but finally closed by granulation. The transverse incision and silk for sutures are recommended. Lesions of the recurrent laryngeal nerve were not observed after enucleation, but occasionally follow extirpation, though they are not generally lasting in character. By extirpation, out of 23 cases 11 were free from relapse, while 4 required a second operation. Of 63 enucleations 44 were found free from relapse, and only 1 case required operation.

DERMATOLOGY.

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HYALINE DEGENERATION OF THE EPITHELIUM OF CARCINOMA.

UNNA (*Dermatologische Zeitschrift*, 1894, Heft 1), in a study of hyaline degeneration as affecting the epithelium of carcinoma, distinguishes nine chief forms. The first forms a division by itself; in this variety the degeneration appears as absolutely round globules of different sizes, usually in groups of four to ten, lying free between the epithelial cells, and having no connection with them, in the intercellular lymph-spaces. All other hyaline structures can be regarded as cellular and specially epithelial derivatives. They fall into two chief groups: the diffuse, unformed hyaline infiltration, and the formed, sharply circumscribed hyaline structures. The formed epithelial derivatives may be arranged under the following divisions:

1. Round balls of considerable size, which show in their interior the remains of a nucleus, or occupy the place of the nucleus, lying in the enlarged nuclear cavity, so that they are surrounded by a free space and are enclosed by the cell-body.

2. Irregular, oblong, spirally-twisted structures, with many protuberances, and frequently extending into long processes having the same color reaction as the body of the structure. This second group is to be regarded as containing structures of the same kind as the first, which have been given their distorted form through pressure.

3. From both the preceding forms a third is to be distinguished, somewhat smaller but also round, which lies in the nuclear cavity beside the nucleus, and has no nucleus-like contents.

4. These small structures without a nucleus are frequently drawn out as if provided with a stem, which often projects from the cell into a second nuclear cavity. The color reaction of this stem is precisely the same as the round body itself.

5. Besides the processes and stems of the nucleated and non-nucleated hyaline bodies, there are similar structures, not attached to the round forms, which extend as hyaline rods or spirals between the epithelial cells.

6. Both the next forms show capsule-like structures. One sees one or several well-preserved nuclei lying in a hyaline-degenerated vesicular (or, upon section, ring-shaped) cell.

7. A second form shows a shell- or vesicle-like hyaline structure, with nuclear contents and stem-like processes.

8. A third form of hyaline vesicle contains, instead of a nucleus, a nucleated globular body corresponding exactly to type 1.

A MODE OF TREATING XANTHOMA MULTIPLEX.

LESLIE ROBERTS reports (*British Medical Journal*, May, 1894) favorable results in the treatment of a case of xanthoma of the hands, elbows, and buttocks, with the following lotion, which was painted upon the affected parts three or four times a day :

R.—Acidi salicylici 3j.
 Liq. epispastici ℥xv.
 Ol. ricini f 3j.
 Æther. acetic. q. s. ad f 3j.—M.

Under the application of this lotion the nodules grew appreciably smaller. After using it for a time, however, it seemed to influence the disease less than in the beginning of the treatment, and the following was substituted for it :

R.—Acidi salicylici 3j.
 Chrysarobini 3ss.
 Ol. ricini f 3ss.
 Collodii flex. q. s. ad f 3j.—M.

Under this application the nodules completely disappeared from the hands and fingers, but those upon the elbows and buttocks were but little influenced, owing, as the author believes, to the difficulty experienced in keeping the lotion effectually applied to these parts.

XANTHOMA MULTIPLEX.

TÖRÖK (*Pest. med.-chir. Presse*, 1894, 44; also, *Monatsh. für prakt. Derm.*, September 1, 1893, p. 247) describes a case of a fifteen-year-old patient who one year before had jaundice, and six months later showed butter-yellow spots and papules, at first at the inner corners of the eyes, corners of the mouth, on the gums of the incisors, flexor surfaces of the joints, neck, abdomen, inguinal region, and palms. The microscopical examination showed always the presence of the so-called "xanthoma cells," that is, cells with one or more nuclei filled with fat-drops. The younger cells resembled the cells of developed adipose tissue and were grouped about the bloodvessels. The disease may be regarded, therefore, as a lipomatous growth. The fat tissue existing to a remarkable extent in the corium is "heterotopic," or out of place. The relation of the disease to icterus and diabetes is not as yet explained.

ANGIOKERATOMA.

CHARLES PIFFAULT (*Thèse de Paris*, 1894) summarizes our knowledge of this rare disease as follows: It is a mixed tumor, not congenital, which is met with especially in adolescence and in winter, seated upon the extremities of the limbs and upon the face, coincident with chilblains and local asphyxia. Histologically it is an angioma which develops primarily in the papillary

layer of the skin, and which by compression of the epidermis becomes hyperkeratotic, ending in the formation of a keratoma. It presents itself clinically in the form of small warty tumors, and of small, red angiectasic spots, disseminated or grouped, more or less numerous, of variable size and color. The formation of the verrucous tumors is always secondary to the flat spots, which themselves may constitute the whole affection. The evolution is very slow, and is without marked general symptoms. The diagnosis is easy, and the growth is benign. The best treatment is electrolysis.

VARICELLA AND VARIOLA.

VETCHTOMOFF, of Nijni-Novgorod (*Vratch*, No. 18, p. 455; quoted from *Brit. Journ. of Derm.*, March, 1894), alludes to Hochsinger's recent article in which he argues that varicella is identical with variola, and then gives the following case to show that varicella is an entirely different disease from variola, and that neither vaccination nor an attack of smallpox can protect against chicken-pox.

In a family with four children (two boys, aged eight and nine, and two girls, three and five), the two boys had been vaccinated in infancy, but the two girls had never been vaccinated. During a local epidemic of smallpox both girls contracted that disease, but the two brothers escaped, though in close contact with the sisters throughout the illness. Two years later, when an epidemic of chicken-pox occurred in the town, all four of the children were attacked with that disease and all speedily recovered.

PRURITUS ANI SUCCESSFULLY TREATED WITH CHLORINATED LIME.

N. K. BERGER (*Zemsky Vratch*, 1894, No. 13) inserts into the anus, about one inch deep, a pledget of cotton soaked in liquor calcis chlorinatæ, and left there until slight smarting occurs, when it is withdrawn, and the anus bathed with the same solution. The operation is to be repeated. Swelling of the parts or concomitant dermatitis, or eczema, are said to be cured by a few applications.

CUTANEOUS ERUPTIONS OF GONORRHOEA.

LEON PERRIN (*Annales de Derm. et de Syph.*, October and November, 1893) points out that eruptions due to this cause (which are not to be confounded with those produced by cubebs and copaiba) are rare, and occur more frequently in men than in women. Individual conditions, such as excesses, fatigue, and complications, seem to favor their development. There is no special period when they are prone to appear, but the third or fourth week of the existence of the gonorrhœa is the most common time.

They consist of (1) purpura, (2) erythema multiforme and erythema nodosum, and (3) scarlatiniform and morbilliform lesions. Hemorrhagic symptoms are rare, and are usually met with in debilitated subjects, especially on the lower extremities.

The common form of eruption is erythema multiforme, and the mucous membrane as well as the skin may be affected. Constitutional disturbance and fever precede the disease of the integument. It tends to appear on the

neck and trunk rather than on the extremities, itching being slight or absent, and leaves in about a week, often with slight desquamation.

Concerning the nature of these manifestations, opinions vary greatly, but the most rational explanation, Perrin thinks, is that they occur through the medium of the nervous system. This would explain their frequent symmetry, their congestive character, the pain referable to the joints, and the non-inflammatory exudation into the joints occasionally noted. The diagnosis is difficult, as the eruptions cannot be distinguished from that due to copaiba, and it is liable to be confounded with scarlet fever, measles, or even smallpox. It may also be mistaken for syphilis, but the glandular engorgement is acute and painful, whereas in syphilis it is indolent.

OBSTETRICS.

UNDER THE CHARGE OF

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PASSAGE OF FOREIGN SUBSTANCES THROUGH THE PLACENTA.

PORAK (*Nouvelles Archives d'Obstétrique et de Gynécologie*, 1894, No. 3) concludes his researches on the above subject as follows:

1. The rôle of the placenta as an organ of accumulation of poisons. It is by its intermediation that poison is transmitted to the fœtus; it constitutes the organ of material changes between mother and fœtus. It plays the part of the lung, of the intestine and of the kidney, and in accumulating poisons its function approaches that of the liver.

2. Differences in the accumulation of poisons in the mother and fœtus. Mercury showed great affinity for the placenta. Lead and copper accumulated most in the fœtus, while arsenic was found chiefly in the liver of the mother and in the skin of the fœtus.

3. *Abortion*. The dead births and poly-mortality of the young following the intoxication. These are explained by the accumulation of poisons in the placenta and nerve centres. With copper and lead, abortion was not observed, but death of the young before birth was common, or else the mother died undelivered. Mercury has the power of producing abortion. Lead intoxication displayed itself in the young by producing cerebral lesions and paralysis. Arsenic produced abortions from placental hemorrhages.

4. Nosological consequences of poisoning in the fœtus. It is important to note that if the placenta is frequently and gravely attacked by syphilis, it is at the same time the elective organ of accumulation of mercury. The accumulation of lead in the cerebral nervous system of the fœtus accounts for the gravity of saturnine encephalopathic accidents. The presence of arsenic in the skin of the fœtus only, explains its therapeutic action in cutaneous diseases.

A NEW METHOD OF PRODUCING PREMATURE LABOR.

BOISSARD (*Répertoire Universel d'Obstétrique et de Gynécologie*, 1894, No. 4), at a meeting of the Société Obstétricale et Gynécologique de Paris, presented a new method of producing premature accouchement by means of an instrument which is described as follows: The instrument is composed of an aluminium tube of some grammes weight; twenty-five centimetres long, the end drawn out and shaped to a flute mouth. This portion is intended to be introduced into the uterus. Its exterior is curved and has a ring six centimetres from the end, which gives the measure of its introduction into the cervical canal; when this touches the os externum, the *bec de flute* is in the uterine cavity. In this conducting tube is placed a caoutchouc tube with an ovoid ampullar extremity, thin and very dilatable. To use the instrument the rubber tube is covered with vaseline and is placed inside the metal, projecting a little beyond the flute-like end. The instrument is passed by the left hand into the vagina and the flute-like end into the cervical canal until the ring rests against the external os. The rubber-tube is then injected, and, as it fills, the ovoid end protrudes and gradually makes its way upward to the internal os. The metal tube is then withdrawn, the rubber balloon being left in place. He claims an infantile mortality of 8 per cent., with absence of complications on the part of the mother. No change in fœtal presentations has been observed.

SYMPHYSIOTOMY.

MORISANI (*Annales de Gynécologie*, April, 1894) contributes an article on symphysiotomy, and comes to the following conclusions regarding the operation:

1. This operation is perfectly justified both in theory and practice. By it a fœtus at term, fully developed, can traverse a pelvis narrowed between the limits of 67–88 mm.
2. If the fœtus be dead or its vitality gravely compromised, this operation is bad.
3. Usually symphysiotomy should be performed at term, when labor has begun and dilatation advanced. Its association with premature labor should not be accepted, though occasionally it may be conjoined with embryotomy, when the child is dead.
4. The operation itself is simple; it is indifferent whether Galbiati's knife or a simple probe-pointed bistoury be used, or whether the articulation be opened from above or below, provided the suprapubic ligament be cut.
5. The movability of the sacro-iliac joint must be assured.

6. In a pelvis of 81 mm. or more, before cutting the articulation, tentative and cautious efforts should be made with the forceps.

7. The forceps is useful after the section in the great majority of cases, but is not indispensable.

8. Osseous sutures and immobilizing apparatus are not necessary. Suture of the soft parts and a restraining bandage are enough. It is a grave error to interpose foreign bodies between the lips of the wound.

9. This operation merits comparison with embryotomy when the foetus is alive, and should be preferred to the latter. It is destined to replace Cæsarean section of choice.

10. It may be discussed in such cases, whether it be better to practise premature delivery in the early weeks of the ninth month, or wait the end of pregnancy and perform symphysiotomy. At a period less advanced than this, symphysiotomy at term merits the preference.

11. Ischio-pubeotomy constitutes a valuable resource in contractions due to ankylosis of one of the sacro-iliac symphyses.

12. The asserted evil results of pubic section are only observed where it is practised in cases outside its limits, and have for cause: *a.* The time of the labor during which it is done. *b.* The manner in which it is done. *c.* The pre-existent lesions of the genitalia. *d.* Special conditions of the patient. The death of the foetus is to be ascribed: *a.* To a tardy intervention. *b.* To accidental circumstances. *c.* To accessory means used in extraction.

SYMPHYSIOTOMY AND CÆSAREAN SECTION FOR THE RELATIVE INDICATIONS.

DAVIS (*The Medical News*, 1894, No. 15) reports two cases of symphysiotomy and one of the Säger-Cæsarean operation, with conclusions drawn from the study of those cases. The first patient was a II-gravida with pelvic measurements as follows: Anterior superior spines, 24 cm.; crests, 25 cm.; transverse 24.5 cm.; external conjugate, 16 cm.; internal conjugate, by measurement, 7.25 cm. Labor began on December 22, 1893, uterine contractions being regular and fairly strong. As the labor progressed, the membranes ruptured, but dilatation was slow and engagement of the presenting head would not take place. As all efforts at engagement, including dilatation of the cervix by means of Barnes' bags, had failed, symphysiotomy was performed. The incision was made above the pubes, terminating three-quarters of an inch above the joint, thus leaving an unbroken cutaneous surface directly over the symphysis. The pubes separated three-quarters of an inch after section. Delivery was accomplished by Tarnier's axis-traction forceps without laceration of the perineum or surrounding soft parts. The child, a male, well developed, lived. A strand of iodoform gauze was carried behind the symphysis to prevent the bladder and adjoining tissues from being pinched when the parts of the symphysis were brought together. The wound was closed in the usual manner, an open stitch being left at the lower end—this stitch being tied when the gauze was removed. Fixation of the pelvis was accomplished by a broad strip of adhesive plaster passed around the trochanters. The mother made a good recovery, and was kept under observa-

tion at the Jefferson Maternity, Philadelphia, for some months after operation. No movement could be detected in the joint. The patient after her recovery was fully able to do domestic work of all kinds. A measurement of the pelvis taken after recovery showed a slight increase of 0.5 cm. between trochanters, 1 cm. in the external conjugate, and 0.75 cm. in the internal conjugate.

The second symphysiotomy was done on a young primipara of poor development and unstable nervous system, who was between the seventh and eighth months of pregnancy. Urine showed albumin, a low percentage of urea, but no casts. Pelvic diameters were as follows: Anterior superior spines, 22.5 cm.; crests, 25 cm.; transverse, 27 cm.; external conjugate, 19 cm.; internal conjugate, 9.5 cm. Labor was induced for symptoms of immediate toxæmia. After a long first period of labor, the head not engaging, notwithstanding the use of Barnes' and McLean's dilators, symphysiotomy was performed by the same method as in the previous case. The child presented in the right occipito-posterior position and presentation, and was extracted by the use of Simpson's forceps with axis-traction tapes. No rotation of head occurred, the child being born in the original position without injury to pelvic floor. Both mother and child made a good recovery, the only complication being an eclamptic attack in the mother eighteen hours after delivery.

As a contrast to the foregoing, the author reports a case in which instead of symphysiotomy, the Sönger-Cæsarean section was necessary. Here the patient was an apparently perfectly developed woman, but who, although five times pregnant, had given birth to but one living child. Pelvic measurements were as follows: A. S. S., 28; Cr., 30; Tr., 29.5; E. C., 19.5 cm. The pelvis was funnel-shaped, the cavity narrowing very appreciably toward the outlet. The child presented by the breech. After consultation, the Cæsarean operation was chosen and performed, and a large female child weighing 11.75 pounds, and 52 cm. long, was safely delivered. The mother's convalescence, although complicated by a serious cough following grippe, and a small stitch abscess, was good. The author concludes that, in cases in which the fœtus is disproportionate in size to the mother's pelvis—and in which, after spontaneous efforts have failed to secure engagement of the presenting part, these efforts have been supplemented by a thorough examination under anæsthesia, and a fair trial to secure engagement by manipulation and suprapubic pressure—if the fœtus be living and in good condition, it is the duty of the physician to refrain from applying the forceps, and to deliver the patient either by symphysiotomy or the Cæsarean operation.

MELÆNA NEONATORUM.

GARTNER (*Archiv für Gynäkologie*, 1893, B. xlv., H. 2), in an article on the above-named subject, concludes that it is an infectious disease, the mode of entrance and the course of the germ not being certain. He believes, however, that the navel is the entrance point. All observations made on cases, and researches on the lower animals, show that first a peritonitis comes, and to this are joined the intestinal affection, the bleeding, and the general infection of the body. Various cultures made from intestinal contents on agar and

gelatin plates or otherwise, with inoculation of the results into guinea-pigs and puppies, give identical results in the bodies of these after death, and the results were apparently those found in children dead from the disease in question. The bacillus showed motion around its transverse axis, and on gelatin, pin-headed spores sharply outlined with concentric rings could be seen. These were gas-producing and had lateral processes (whips), and can be distinguished from gas-forming bacilli, typhus bacilli, and the bacillus coli commune.

THE FIMBRIAL CURRENTS AND MIGRATION OF THE OVUM.

HEIL (*Archiv für Gynäkologie*, 1894, B. xliii., H. 3) refers to the various views of many authors and his reasons for differing from many of them. He details the results of twelve experiments made by himself on rabbits. Having opened the peritoneal cavity, he injected a solution of sodium chloride containing powdered charcoal into the cavity. In some cases the injection was made into the whole cavity; in others into peritoneal pockets. In all experiments the results were similar. Minute particles in close proximity to the current of the cilia of the fimbriated end were swept into the infundibulum or into the tube. Corpuscles more remote were not affected. Ova, even if brought very near, remained immovable. In conclusion, the experimenter thinks that proof is wanting of a constantly acting fimbrial current able to move ova lying on the peritoneum to the abdominal mouth of the tube, and he doubts also if this can be certainly established experimentally. Many impulses are to be considered in the migration of the ova. If the fimbria embrace the follicle, the case is very simple. If the ova escape near it in the narrow space between the end of the tube, ovarian capillarity, aided by the escaping fluid from the follicle, may drive the ovum into the tube. If the ovum falls into the general peritoneal cavity, it is usually lost, unless by chance it drops within the reach of the cilia, or be floated thereto by the peritoneal serum.

TEMPERATURE RELATIONS IN THE FIRST WEEK OF LIFE.

FEIS (*Archiv für Gynäkologie*, 1894, B. xliii., H. 3) contributes the results of a series of observations on the relations of temperature during the first week of infantile life. On 25 children he made 2921 observations, using a maximal thermometer, in all cases the temperature being taken in the rectum, carefully avoiding the introduction of the instrument into any fecal mass. So far as possible the observations were made under similar circumstances. The thermometer was retained fifteen minutes. The temperature of both mother and child was taken at the same time. The tables show that the child's temperature exceeded the mother's by about 0.6°C ., the sex of the child making little difference. Marked immaturity of the child seemed accompanied by a slightly lower temperature. Immediately after birth a rapid fall of from 0.86°C . to 1.7°C . takes place, chiefly through the skin; depending on the temperature of the outer air and also on the bath. Then comes a more or less rapid rise, till within about thirty-six hours the norm is reached. The amount of food absorbed by the child seems to have some influence on the temperature augmentation.

GYNECOLOGY.

 UNDER THE CHARGE OF

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THE TREATMENT OF PELVIC ABSCESS.

LANDAU (*Archiv für Gynäkologie*, Bd. xli., Heft 3) concludes an extended article on this subject with the following *résumé*: A unilocular abscess pointing in the vagina should be incised through the posterior fornix; if it is also prominent through the abdominal wall, evacuation of the pus through simultaneous external and internal incisions will hasten a cure, though a counter-opening for this purpose is seldom necessary. It makes no difference whether the abscess thus treated is intra- or extra-peritoneal, so long as it consists of a single cavity.

In the case of a recurrent *multilocular* abscess, as in unilateral pyosalpinx, extirpation by *cœliotomy* is alone indicated, but if after opening the abdomen the collection of pus is found to be extra-peritoneal, it is better to evacuate the latter per vaginam. In cases of double unilocular abscesses vaginal incision and drainage should be practised, since in this way the functions of the tubes and ovaries may be preserved, while a radical operation can be performed just as well subsequently if desired. Multilocular abscesses involving both tubes, simple or complicated with extra-peritoneal pus-collections, may be removed by *cœliotomy*, but a better prospect of effecting a radical cure is offered by vaginal extirpation of the uterus with the adnexa. This is best effected by morcellation and the use of clamps. Péan and Segond's recommendation to secure drainage by the removal of the uterus alone, in complicated cases in which the pus sacs cannot be extirpated per vaginam, does not appear rational. Under these circumstances it is better to remove as much as possible from below, and the rest of the diseased tissues through an abdominal incision. In case of doubt as to the existence of bilateral suppurative disease, explorative *cœliotomy* is first indicated. In other cases, even when it seems doubtful if the affected organs can be entirely removed per vaginam, the attempt should first be made from below, except where examination has shown that the pus tubes are situated high up in the pelvic cavity; under the latter circumstances adhesions should be broken up and the adnexa removed by *cœliotomy*, after which the uterus should, in every case, be extirpated per vaginam on account of the far greater relative safety of this procedure. Experience has shown that those cases do better in which combined drainage is used, a glass tube being left in the abdominal wound for three or four days.

The favorable results of the vaginal operation, remote as well as immediate, in complicated cases of pelvic suppuration, justify us in applying it to simple cases also in which the adnexa are removed without the uterus.

More care should be exercised in determining before operation whether suppuration is uni- or bilateral, since it may be possible to resort successfully to less heroic measures if this point is positively settled beforehand. It is greatly to be desired that, in publishing statistics, gynecologists should state more precisely in citing cases of pelvic suppuration, the origin of the abscess, whether intra- or extra-peritoneal.

VARICOCELE OF THE RECTO-VAGINAL SEPTUM.

CHÉRON (*Revue Méd.-Chir. des Maladies des Femmes*, 1894, No. 1) describes under this term a varicose condition of the veins in the recto-vaginal septum, recognized as a hard, sensitive, elongated swelling, which may extend from the posterior fornix as far down as the lower third of the vagina. It is often associated with hemorrhoids, both being due to obstruction of the intra-pelvic veins, caused by various affections. Lumbar neuralgia is one of the accompanying symptoms. Aside from the removal of the cause, the writer advises massage of the swelling and steady pressure exerted from below upwards.

VAGINAL HYSTERECTOMY FOR PROCIDENTIA.

SAVAGE, in a recent discussion on this subject at the British Gynecological Society (*Brit. Gyn. Journ.*, 1894, No. 2), approved the operation in intractable cases of complete procidentia occurring in patients after the menopause. He made the surprising statement that the operation was attended with much less risk than was either ventro-fixation or shortening of the round ligaments, which was severely criticised by Fenton and Bantock. The former believed that ventro-fixation was applicable to all such cases, while the latter stated that in an experience of thirty years he had never met with a case of prolapsus in which perineorrhaphy and the use of a Hodge pessary were not sufficient to correct the displacement (!)

[Comparison of this discussion with one on the same subject at a recent meeting of the New York Obstetrical Society shows that English, as well as American, gynecologists find it difficult to modify their long-cherished views in accordance with the progress of modern surgery.—ED.]

TERMINATIONS OF NERVES IN THE FEMALE GENITAL ORGANS.

KÖSTLIN (*Fortschritte der Medicin*, 1894, No. 11), from extended microscopical observations in the lower animals, as well as in the human subject, arrives at these conclusions: In the Fallopian tubes of sheep there are but few nerves in the mucosa and no plexuses. The nerve fibres are either distributed directly to the epithelium or first enter the extremities of the mucous folds and then terminate in the cells; their ultimate terminations in the epithelia were not demonstrated. Triangular ganglion-cells are found in considerable numbers in the mucosa, from which extend many fibres thicker than the other ones and not so tortuous, which sometimes anastomose with other neighboring processes and can be traced directly to the epithelia. In the tubal mucosa of pigs there is a rich anastomosis of nerve fibres, with finer branches, which can be followed into the epithelial cells, though it is impossi-

ble to discover their ultimate terminations. In the uteri of rabbits intricate plexuses exist in the endometrium, their fibrillæ terminating either directly in the epithelia or in end-bulbs. In guinea-pigs, fibres can also be traced into the glands, where they end between the cells. Numerous ganglion-cells with interlacing processes are also seen, especially in calves, in which animals spindle-shaped cells are found with numerous interlacing processes, which may belong to the nervous system, though this is doubtful. The same cells are seen in the endometrium in sheep.

OVARIOTOMY DURING PREGNANCY.

GORDON (*Centralblatt für Gynäkologie*, 1894, No. 23) reports five successful cases from Lebedeff's clinic, three of the patients aborting (one on the fifth and two on the fifteenth day after the operation), while in the other two pregnancy was not interrupted. He collected two hundred and four cases, in twenty-one of which it was not stated whether the pregnancy was interrupted or not. In seven the uterus was injured, two patients succumbing. Of the others, 93.2 per cent. recovered, and 6.8 per cent. died; 22 per cent. aborted, while in 69.4 per cent. delivery occurred at full term. The total mortality was only 3 per cent., while in 78 per cent. of all the cases the pregnancy was not interrupted.

THE TREATMENT OF ANTEFLEXION BY HYSTEROPEXY.

CONDAMIN (*Le Mercredi Médical*, 1894, No. 20) states that Laroyenne, finding the ordinary surgical methods of treating anteflexion unsatisfactory, has resorted to ventro-fixation, which causes a permanent straightening of the flexion with an entire relief of the symptoms to which it gives rise. Though temporary benefit is obtained by divulsion, the obstruction sooner or later returns, since it is impossible that the weight of the fundus uteri plus the intra-abdominal pressure should not cause a persistence of the angle of flexion. In fixing the uterus it is necessary to exercise some care to select a point somewhat high up on the abdominal wall in order to exert traction on the vagina and thus to keep the cervix straight. While pregnancy is undoubtedly rendered possible by the operation, it cannot be denied that it may be influenced unfavorably by the fixation. Two cases are reported in which dysmenorrhœa was thus entirely relieved.

SURGICAL TREATMENT OF VAGINISMUS.

POZZI (*Ibid.*) performed the following operation in the case of a patient whose hymen remained intact and extremely sensitive eight years after marriage: The hymen was first incised with scissors and the vulva was forcibly dilated with an anal speculum. Then a lateral incision about one and one-half inches long was made from right to left at the junction of the lower and middle thirds of the vulvar orifice, extending a little below the line of insertion of the hymen and forming a cross with it. The fibres of the constrictor cunni were exposed and their superficial bundles were divided. The flaps were then dissected up, forming an elongated lozenge-shaped wound with its long axis parallel with the edge of vulva. This was closed with silkworm-gut

sutures in such a manner that the line was at right angles with the original incision. By performing this operation on both sides the result is practically the same as in a double Tait's flap-splitting perineorrhaphy. The vulva is enlarged and the mucous membrane of the vagina is rolled out in such a way as to sustain during coitus the mechanical friction which originally gave rise to reflex symptoms. The operation is applicable to all cases of vaginismus due to hyperæsthesia and contraction of the vulva, but is contra-indicated when the spasm is a reflex one, symptomatic of a more remote genital affection.

INTRA-UTERINE CAUTERIZATION.

SÄNGER (*Centralblatt für Gynäkologie*, 1894, No. 25) in a paper on this subject, read before the Leipzig Obstetrical Society, criticises sharply the generally accepted view that gauze when introduced into the uterine cavity acts as a drain. He believes that when the os is not stenosed the uterus drains itself, artificial drains simply acting to plug the canal and prevent the escape of the accumulated blood. The gauze only permits the discharge of a thin, watery secretion, but not the escape of purulent or viscid material and coagulated blood. There is neither disinfection of the uterine cavity, as Abel maintains, nor the establishment of permanent drainage, as claimed by Skutsch. It is only after the removal of the gauze that there is an escape of the retained secretion. The rise of temperature often noted is an indication of this retention. The expression "gauze drainage" is incorrect; it should be "gauze tamponade." The gauze simply dilates the cervical canal and sets up uterine contractions, thereby increasing the circulation in the uterus. After its removal drainage is better because the canal is more patent. There is no medicinal effect from the iodoform. The writer has had better results from the use of gauze saturated with a solution of chloride of zinc; in fact, he uses the gauze tamponade merely as a preliminary to cauterization of the endometrium. The real action of intra-uterine caustics has been generally misunderstood. Gynecologists do not allow sufficient time for the caustic to act, but repeat the application at frequent intervals, without waiting for the slough to separate; hence frequently arise cicatricial stenosis and other bad results. Again, weak solutions are ordinarily used, such as tincture of iodine, acetic acid, dilute carbolic acid, and liquor ferri sesquichlor., which not only do no good, but, when frequently applied, often cause violent irritation and increase the local pain.

The writer's practice is to apply strong caustics at long intervals; fifty per cent. chloride of zinc, introduced on cotton (wound around a silver probe) being suitable in all forms of endometritis. A narrow cervix, such as is often present in virgins or nulliparæ, is a contra-indication. In this condition the writer first uses, experimentally, a weak solution of zinc (ten per cent.) or tincture of iodine. The strong solution is applied at intervals of from sixteen to twenty days, two or three such applications being sufficient to cure a case of ordinary catarrhal endometritis. Erosions of the cervix he formerly touched with fuming-nitric acid every three weeks, but now uses instead the strong solution of chloride of zinc. The thermo-cautery is the ideal aseptic caustic in the treatment of erosions. The writer, of course, places curettage before intra-uterine cauterization as a means of treating endometritis.

In the discussion of this paper, ZWEIFEL agreed with the reader that gauze did not really drain the uterine cavity. He had abandoned the use of iodoform gauze as a vaginal tampon in cases of hemorrhage, preferring to use pledgets of cotton saturated with acetate of aluminium. Gauze introduced into the uterus checks hemorrhage, but only in the same way as any foreign body, *i. e.*, by causing contraction of the organ. He was inclined to go still farther and to affirm that gauze when introduced into the peritoneal cavity acts purely as a tampon and not as a drain.

DÖDERLEIN expressed the same opinion with regard to the inefficiency of so-called uterine gauze drainage. He was opposed to the common practice of applying a caustic to the raw surface left after curettage. Iodoform gauze has no medicinal action within the uterus; the iodoform is simply mingled with the blood-clot and is not absorbed at all.

[We are glad to receive such weighty support of an opinion which we have held for some time, in spite of our habitual use of the gauze drain after curettage. Notwithstanding the emphatic commendation of this practice by eminent American gynecologists, we have long been in doubt as to the amount of drainage secured by tamponade of the non-puerperal uterus, even after the cervix has been thoroughly dilated. In our experience not only has a frequent slight rise of temperature during the first twenty-four hours after operation indicated retention of secretions, but drainage has only been free *after removal* of the gauze. Säger's well-known iconoclastic tendency is supported by so much native keenness and common sense that we cannot afford to treat lightly his criticism of this generally-accepted practice.—ED.]

SURGICAL TREATMENT OF FIBROMYOMA OF THE UTERUS.

THIS subject continues to excite the keenest interest among abdominal surgeons here and abroad, as shown by the prominence assigned to it in recent society discussions. Not to speak of the papers read before our own societies during the past three or four months, the following have appeared in foreign journals:

LEOPOLD (*Centralblatt für Gynäkologie*, 1894, No. 26) reports twenty operations with one accidental death at the end of the third week, due to pulmonary embolus. He claims for his method of intra-peritoneal treatment of the stump that it reduces the loss of blood to a minimum, shortens the operation, and thus eliminates the element of shock. In one hundred and sixty operations for fibromyoma performed since 1889 by all methods (including forty-six cases of enucleation per vaginam and forty of castration), his mortality was only 2.5 per cent. In twenty-four cases of total vaginal extirpation of the fibroid uterus there was no death, while the total mortality in ninety abdominal operations was only 4.4 per cent. The writer's present technique in supra-vaginal amputation is as follows: After delivering the tumor the upper part of the incision is closed. The broad ligaments are ligated with silk, the uterine arteries and veins being tied *en masse* when the stump is small, without securing the latter with an elastic cord. If, by reason of the unfavorable conditions, it is impossible to isolate the uterine arteries, the base of the tumor is surrounded with a rubber cord, the capsule is split, and the growth partially enucleated. The peritoneum is then dissected off as low as the cord, *i. e.*, to the point of attachment of the bladder, the tumor

is removed, and the stump trimmed down as much as possible, the vessels being at the same time ligated at about the level of the os internum, and the ligatures cut short. The cervical canal is cauterized, then the stump is transfixed and ligated in two portions with stout silk ligatures, which are also cut. The peritoneal flaps are carefully sutured over the stump with fine silk, including a portion of the subjacent cervical tissue, all pockets around the uterus having been previously covered over with peritoneum. The abdomen is then closed without drainage.

DEMETRIUS (*Ibid.*) describes a somewhat similar operation which, in his hands, was attended with a mortality of only 4.3 per cent. in twenty-four cases. He cures the uterus and cauterizes the cervical canal as a preliminary step. In ligating the uterine arteries a portion of the uterine tissue is purposely included on either side, which not only serves as an efficient safeguard against hemorrhage, but renders the elastic cord superfluous. If there is much bleeding from the stump it is transfixed on both sides, the ligatures being passed through the tissue just outside of the cervical canal from before backward. If the stump is large other ligatures may be used, but as none of these encroach upon the canal, it is left open for drainage, which is favored by the introduction of a strip of gauze. The raw surfaces are not covered with gauze. The peritoneal folds are simply allowed to fall together without being sutured.

The same writer thus summarizes with regard to the treatment of fibromyoma: All methods of treatment, including Apostoli's, which do not aim at the actual removal of the growth are to be regarded as simply palliative. Castration is an uncertain measure, has only a limited application, and is opposed to the essential principles of conservative surgery, since the healthy(?) ovaries are sacrificed. Progressive increase of existing symptoms is an indication for removal of the tumor; palliative treatment under these circumstances simply aggravates the trouble and affects unfavorably the prognosis of the radical operation, hence the latter should be elected early. Vaginal extirpation of the myomatous uterus, when possible, is preferable to the abdominal method. Supra-vaginal amputation gives better results than total abdominal extirpation, and the intra-peritoneal method of treating the stump is preferable to the extra-peritoneal. There is no reason why the mortality of supra-vaginal amputation should not be as low as that of ovariectomy.

THE CAUSE OF PAIN IN UTERINE FIBROMYOMA.

QUÉNU (*Gaz. Méd. de Paris*, 1893, No. 48) attributes the pain in fibromyoma to several factors, chief among which is pressure of the tumor upon the sacral plexus, especially if it is impacted in the pelvis, or upon the lumbar plexus when it extends upward into the abdominal cavity, or is freely movable. Severe pains are also referable to pressure of the tumor upon the ovary, when the latter is healthy. Irritation of the peritoneum, especially in Douglas's pouch, may cause pain, even when there is no peritonitis. Inflammation of the growth itself, of its serous covering, and of the tubes and ovaries, are also important factors. Retention of blood within the uterine cavity and infection of the same may readily lead to inflammatory conditions in the tumor, on account of the rich vascular supply of the endometrium and its intimate relation to the fibro-muscular tissue in the broad ligament.

PÆDIATRICS.

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OF PHILADELPHIA.

ON SCARLATINA-LIKE RASHES IN CHILDREN.

ASHBY, of Manchester (*Medical Chronicle*, June, 1894, p. 161) publishes a thoughtful paper under this title. In spite of the well-marked characteristics of scarlatina, he remarks, the difficulties of diagnosis and the perplexities to which they give rise are well known. Scarlet fever may be a practically feverless disease, the temperature not exceeding 99.5° or 100° F. for a couple of evenings; the fauces may be only doubtfully reddened; there may be an absence of the yellow spots on the tonsils, so often present; and the whole diagnosis, as far as scarlet fever is concerned, may turn on the character of the red rash. At other times a well-marked red rash makes its appearance in the course of some other disease, like pneumonia, or after an operation, or during suppuration of some sort, and much difficulty may be experienced in determining whether scarlet fever is present as a complication or not. The author has seen cases which, during an epidemic of influenza, resembled in their general symptoms this protean disease, and yet were accompanied by a rash closely resembling scarlet fever. This association of influenza with a red rash has been noticed by Kramsztyk, who records many cases in a recent epidemic of influenza in Warsaw, and appears to have no doubt that these cases were quite distinct from any scarlatinal infection. On the other hand, Filippow records sixteen cases in which influenza was complicated with scarlatina in a mild form.

The disease which at times most closely resembles mild scarlatina is the scarlatina form of rubella. This disease, as is well known, usually resembles measles rather than scarlet fever, and sometimes very closely. Whether there are really two distinct diseases included under the name of rubella which do not protect from one another, or whether there is only one disease which is modified by influences of which we are ignorant, so as at one time to resemble measles and at another time to resemble scarlet fever, it is at present impossible to say.

In the author's experience some years ago an epidemic of this form of rubella was at first considered to be mild scarlatina until the first cases admitted to the Children's Hospital and sent to the scarlatina ward promptly developed scarlet fever while the first rash was fading. In the primary disease there was an absence for the most part of vomiting; the fever was only slight; a sore-throat was mostly complained of, and there was slight tonsillitis to be seen on examining the fauces. The rash was general, bright red, and

punctiform, exactly resembling that of a mild case of scarlet fever. Similar epidemics have been described by Filatow and Kramsztyk. In two of the cases described by the latter there had been previous attacks of scarlet fever attended by himself; one later had a typical attack of the ordinary type of r  theln, and another true measles. The attacks began suddenly with fever, headache, and sometimes vomiting, with a red rash. The fever, which ranged from 101   to 103  , lasted from two to four days, and the rash about the same time. The rash was general except on the face, and indistinguishable from scarlet fever; there was hardly any tonsillitis. The headache and malaise usually lasted only one day, and so by the second or third the child was practically well but the rash remained visible. In one case there was swelling of the cervical glands.

Desquamation is mostly absent. Difficulty in diagnosis principally occurs in isolated cases, or in the first case or two coming under notice. When other cases occur the long period of incubation of rubella would be a valuable aid. The author raises the question whether rubella, when it assumes the scarlatinal type, has a shorter incubation than in the other form.

Surgical scarlatina, he believes, is in most cases scarlatina occurring in a subject under the care of a surgeon, but in cases in which there is an excessive amount of suppuration there may be a red rash due to septic  mia. It occurs in cases of scarlet fever where there is much suppuration about the neck and fauces, the rash looking at first sight like a second scarlet eruption, but it is apt to be more patchy and of a duskier hue. A similar rash may be seen in empyema with much pus-formation. The rash seen in severe cases of diphtheria is no doubt also septic, though it is now a well-recognized fact that a membranous exudation exactly resembling true diphtheria may be present on the fauces in scarlet fever, but the Loeffler bacillus is absent. The inflammatory form of diphtheria is sometimes exceedingly like scarlet fever, beginning with vomiting and high fever; especially if there were a dusky septic rash present the likeness would be still more close.

Among the drugs, belladonna is the only one that produces an erythema liable to be mistaken for scarlet fever. Antipyrine certainly at times produces a rash, but it is more of the measles or nettlerash type.

The question of desquamation, which is apt to follow all diffuse rashes, especially where there has been fever, is of great importance. The author believes that as indisputable evidence of scarlatina desquamation is greatly overrated. Mild cases of scarlatina often do not desquamate at all, or differ in no way from other febrile attacks, such as influenza, pneumonia, or typhoid.

TREATMENT OF DOUBLE EMPYEMA IN CHILDREN.

G. A. SUTHERLAND (*Lancet*, June 9, 1894, p. 1439) reports four cases of this interesting and rather rare affection, and tabulates the leading facts in 17 cases collected from the literature. As regards etiology, 14 (67 per cent.) were secondary to lobar pneumonia, one was preceded by influenza, one by broncho-pneumonia, two are described as primary, and in three the history of previous illness is indefinite. This corresponds very closely with the statistics of unilateral empyema given by ADAM (*Archiv f. Kinderheilk.*, Bd. xv., Hefte 5 u. 6), who found that in 32 cases, 23 (71 per cent.) were preceded by lobar

pneumonia. In the four cases reported by the author, occurring in children from two and a half to six years of age, the treatment adopted was double resection, irrigation, and drainage. After resection the pleural cavity was explored with the finger to break up adhesions and estimate the size of the cavity, and a short drainage-tube inserted, which was removed usually within a week. To this practice of temporary drainage he attributes the rapid recovery, the average duration of drainage in his four cases being seven days, as contrasted with seven weeks in the other cases published. This fact has especial bearing on the treatment of cases of double empyema, where, if one side is speedily cured, the other can then be treated without danger in the same radical manner, aspiration having been performed, if necessary, in the meantime. This would seem to be the most satisfactory method, for in the reported cases of "simultaneous drainage" the collapse has frequently been alarming, and the signs of cardiac and respiratory embarrassment very marked. As regards the side to be operated on first, the greatest relief will probably be obtained by selecting the side on which there appears to be the larger amount of fluid. After the operation-wounds have healed, an important part of the treatment is the employment of forced respiratory movements and chest-expanding exercises.

A CASE OF PARALYSIS FOLLOWING DIPHTHERIA OF THE GENITALS ONLY.

W. GAYTON (*Lancet*, May 26, 1894, p. 1301) reports a case of purely genital diphtheria in a girl of four years, who was admitted to the Northwestern Fever Hospital. The skin of the groins, labia, and vulva was excoriated from a very offensive, copious vaginal discharge. On separating the genitals the parts were found to be extremely swollen and covered with a membranous exudate of true diphtheritic character, which had also crept along the vagina as far as could be seen. The temperature was 96°, the countenance very pallid, and the pulse feeble and slow. The vulvitis had existed for a fortnight, but the throat was not, nor had it been previously, affected.

Twenty-two days later, under tonic treatment, together with local use of a perchloride of mercury solution, the parts were nearly healed and the vaginal discharge had ceased; but the urine still continued slightly albuminous, and the temperature and pulse subnormal. Four days later marked strabismus was observed, also palate paralysis, with regurgitation of fluids through the nostrils and an irritating, noiseless cough. In three days more the muscles of visual accommodation were impaired and the paralysis continued to increase until, ten days later, death occurred, apparently from direct toxic action of the diphtheritic poison on the bulbar centres. The chief point in view in recording the case, the author says, is to qualify a statement recently made, that diphtheritic paralysis does not follow except when the fauces have been previously affected.

A CASE OF URTICARIA PRODUCED BY SANTONIN.

G. STEWART ABRAM (*Lancet*, May 12, 1894, p. 1186) relates the following case: A child seven years of age was brought to him suffering from thread-worms, which had been present for three years. She had been under treatment once before for this cause, but had not taken santonin. The child was

rather pale and flabby and had a slight cough. Santonin powders of three grains each were ordered to be taken fasting on alternate mornings for three days, preceded on the previous night by castor oil and followed by a similar dose. She had a dose of castor oil on the night of April 21st and her first powder at 7 A.M. on the 22d. On this occasion the only sign of any eruption was a red œdematous patch the size of a five-shilling piece on the left forearm, which was rather irritable and was ascribed by the mother to an insect bite. On the 24th she had the second powder at 7 A.M., and by 8 A.M. the face was red and puffy, and in a short time the whole body and the limbs were œdematous and covered with a typical urticarial eruption, consisting of large white wheals surrounded by a broad, red areola. There was some irritation, but it was not at all intense, and by 11 A.M. the rash had almost entirely disappeared. To verify the cause the third powder was given at 7.20 A.M. on the following day, and in an hour a similar rash, if anything more intense, had appeared. The bowels were freely opened about 9 A.M., and the rash had entirely gone by 10 A.M.

Sieveking (*Brit. Med. Journ.*, February 18, 1871) mentions a similar example, and Morrow, in his work on drug eruptions, quotes a number of cases recorded by Hubert, in which the administration of santoninate of soda was followed by an eruption of pin-sized vesicles on the trunk and limbs. It appears, therefore, that the santonin idiosyncrasy is rare, and that the eruption may vary in character, is accompanied by little or no constitutional disturbance, and rapidly disappears, leaving no ill-effects.

THE STARTING-POINTS OF TUBERCULOUS DISEASE IN CHILDREN.

J. WALTER CARR (*Lancet*, May 12, 1894, p. 1177) presents an interesting paper under this title founded upon the records of 120 necropsies made at the Victoria Hospital, Chelsea, upon children suffering from tuberculous lesions, in no less than 82 of which the disease was more or less generalized. The most important general conclusions are these: 1. That tuberculous disease in children commences usually in the glands, the liability being at its maximum during infancy and early childhood, and rapidly decreasing in later childhood. That caseous glands, especially the internal ones, may (*a*) remain quiescent for an indefinite period; (*b*) start tuberculous mischief in adjacent parts, especially the lungs, by direct extension; and (*c*) set up general military tuberculosis. 2. That the internal glands, at any rate, are probably most often infected directly from the organ with which they are connected, although the possibility of infection through the blood-stream must not be forgotten. 3. That tuberculous disease starts much more frequently in the thorax than in the abdomen, and certainly far more often in the thoracic than in the mesenteric glands. This does not throw any doubt upon milk as a possible source of tuberculous disease, but this does not seem to be by any means a frequent mode of infection as compared with that through the lungs. At the same time the importance attached by Dr. Woodhead, on the basis of his statistics, to the mesenteric glands, indicates the necessity of a further and prolonged investigation of the pathological evidence, not in one place only, but in all parts of the country—for the conditions producing tuberculous disease may vary materially in different localities. 4. That glandular

disease may often exist alone and quite unsuspected; in very many cases, doubtless, it is quite impossible of diagnosis. 5. But, after all, by far the most important treatment is the prophylactic. Whether the glands get infected directly through the lymphatic channels or indirectly through the blood-stream, the organisms must in every case have passed in through the mucous membrane, and through a healthy one they probably cannot penetrate. We have, therefore, to try to prevent gastro-intestinal and respiratory catarrhs, and especially to avoid their becoming chronic; to deal promptly with, and if possible to prevent, rickets, the great cause of such catarrhs in early childhood; and to take especial care of children during convalescence from measles, whooping-cough, and other acute specific diseases, so liable to depress the vitality of the body generally, and the resistant power of the mucous membranes, as well as the filtering power of the glands, in particular.

PRIMARY SARCOMA OF THE SUPRA-RENAL CAPSULE IN AN INFANT.

COHN (*Berliner klinische Wochenschrift*, 1894, No. 11, p. 257) reports an interesting case of the kind in a girl of nine months. She was brought to the clinic for a tumor of the right temporal region with exophthalmos of the right globe. Examination showed a diffuse tumor of the temporal region limited in front by the external margin of the orbit and behind by the ear. The mass was adherent to the underlying tissue and was covered by movable but highly vascularized skin. Some similar nodules were found behind the ear and upon the vertex. The right eye was very prominent. The liver was considerably enlarged, and a little below it, but not connected with it, was a round tumor. The spleen was also slightly enlarged.

The diagnosis was neoplasm of the kidney with multiple metastases. During the three weeks following, the tumor of the temporal region grew very rapidly and invaded the nasal fossæ and the palate; the abdominal tumor had increased posteriorly and become prominent in the lumbar region.

At the autopsy a medullary sarcoma of the right supra-renal capsule was found, with metastases in the liver, the kidneys, and the ribs at the costochondral junctions.

A PECULIAR SYNDROME IN TUBERCULOUS CHILDREN.

WEILL (*Lyon Médical*, 1894, Nos. 20 and 21, p. 77) calls attention to a peculiar association of symptoms which he has observed in several cases of pulmonary tuberculosis in children. This is characterized by cyanosis of the face and extremities, a sensation of coldness coincident with a notable depression of the central and peripheral temperature, arterial spasm, increase in the number of red corpuscles in the cyanotic areas, increase in the size of the spleen, and transitory albuminuria. This syndrome is produced simply by a change of posture from the recumbent to the standing, or by passage from a warm temperature to a moderate or a cool temperature. The phenomenon is transitory, its duration varying from several minutes to several hours. It has an intermittent course, being produced very easily at certain periods and not showing itself at others. It appears to be independent of the clinical aspect of the pulmonary tuberculosis, of the predominance of any symptom,

or of the extent and gravity of the lesions. It appears at the beginning of tuberculization as well as at an advanced period, and it is independent of *régime* and of season.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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EMBOLISM OF THE ABDOMINAL AORTA.

MATIGNON, in an article in *La Médecine Moderne* (26 Mai, 1894) reviews our present knowledge of this rare condition. He finds in the literature twenty-five cases, upon which his conclusions are based. Of these, twelve occurred in men. No case occurred before the twentieth year. In the majority of the cases the embolism occurred in connection with an infectious disease, usually associated with an endocardial lesion. Thus, in six cases it followed acute articular rheumatism; in five cases puerperal pyæmia; in four erysipelas; once each, typhoid fever, pneumonia, syphilis. In four cases there were endocardial lesions of indeterminate character. Usually emboli are found in various parts of the body in cases of fatal embolism of the aorta. The usual seat of the embolus is the bifurcation of the vessel, and it may occlude one or both of the common iliacs completely or partially. The symptoms vary somewhat in different cases, depending chiefly upon the degree of occlusion of the vessel. Their onset is sudden, and the most constant are violent pains in the lower extremities, paraplegia, cessation of pulsation in the arteries of the lower limbs, lower temperature of the legs, and rapid trophic change resulting in gangrene. The prognosis is very grave, twenty-three of the twenty-five cases described having died, usually within four days after the onset of symptoms. For such a condition treatment could hardly be expected to be of much avail.

DYSENTERY AND ABSCESS OF THE LIVER.

In the autumn of 1892 KRUSE and PASQUALE visited Egypt for the purpose of studying the dysentery there prevalent, more particularly as it bears upon the so-called tropical abscess of the liver. The results of their investigation are set forth at length in an exhaustive article in the *Zeitschrift für Hygiene und Infektionskrankheiten* (1894, xvi. pp. 1-148).

After a review of the work already done as regards the etiology of dysentery they describe the monads and *amœbæ* which are frequently present in the intestine of the Egyptians during health, and to which no pathogenic qualities attach. The *amœbæ* thus found by Kruse and Pasquale do not differ morphologically from those found associated with dysentery. The relation-

ship of the *amœba coli* to one of the forms of dysentery has been so clearly demonstrated by Kartulis and by Councilman and Lafleur that it is not strange that Kruse and Pasquale should have first directed their attention to it. Fifty cases of amœbic dysentery were studied. In forty of these the amœbæ were found in the stools. In every case examined post-mortem they were found in large number in the ulcers. In all, twenty-six cases, including cases of abscess of the liver, came to autopsy. These were subjected to careful bacteriological examination, as were also about two hundred dysenteric stools, with the result of finding bacteria of several species in all, but none constantly or under such conditions as to make apparent any etiological relationship between the disease and their presence.

As regards the pathological anatomy of the lesions of amœbic dysentery the following may be said: The lesion is essentially a catarrh of the mucous membrane of the colon, which later becomes ulcerative as the result of necrosis. The site of the first structural changes is the submucosa, into which the amœbæ penetrate in large numbers, causing swelling and œdema of the tissue with subsequent necrosis. There is no real inflammation with any considerable growth of the tissue cells or emigration of the formed elements of the blood. The necrosis secondarily extends to the mucosa, and its result is the formation of ulcers. These ulcers, as a rule, have overhanging and swollen edges. The amœbæ were always found in the submucosa, never by Kruse and Pasquale in the mucosa. They lay in the interstices of the tissue between the cells and between the connective-tissue fibres. In all cases bacteria were associated with the amœbæ in the dysenteric ulcers, and it is suggested by the authors that certain of the structural changes may be the result of their action in association with that of the amœbæ. Small hemorrhages in the neighborhood of the ulcers were frequent. The most characteristic feature of the process is, however, the absence of inflammatory exudate, notwithstanding the often large size of the ulcers.

Fifteen cases of abscess of the liver were studied, in six of which a direct connection with dysentery could be made out. These all showed the presence of the amœba in the abscess; the other nine did not. Kartulis, to whom we owe a most exhaustive study of the Egyptian dysentery, found the amœbæ chiefly in the walls of the liver abscesses; Kruse and Pasquale found them only in the necrotic material filling the abscess cavity. Bacteria were present in five of the six dysenteric abscesses, in three of the idiopathic abscesses. In four of the eight cases in which bacteria were found they were streptococci. Two anatomical forms of dysenteric abscess of the liver are described, a cirrhotic form and a necrotic form. These are supposed to be in a measure dependent upon the age of the process, the formation of connective tissue in the cirrhotic form being regarded as an indication of healing of the process, since, after the disappearance of the amœbæ, the abscesses heal by cicatrization.

Kruse and Pasquale did not succeed in cultivating the amœbæ, and they are inclined to doubt the correctness of the culture experiments of Kartulis. They succeeded, however, in producing a lesion in cats somewhat similar to that observed in man, by the injection of feces and abscess contents containing amœbæ into the rectum and causing it to be retained there for from twenty-four to forty-eight hours. Of sixteen such experiments with feces,

eight gave a positive result; of seven in which abscess contents was employed, three were successful in producing the lesion. This consisted of a hemorrhagic catarrh of the lower portion of the colon, often accompanied by slight ulceration. In no case was there such swelling of the submucosa and such extensive ulceration as is observed in man. The amœbæ were found in the crypts of Lieberkühn in immediate proximity to the ulcers and in the tissue composing the floor of the ulcers. Thus, though the process in the cat differed somewhat from that in man, there could be no doubt as to the etiological relationship of the amœbæ to it. Similar injections with the common amœbæ of hay infusions and with the bacteria found in the feces and lesions of dysentery were without result in producing any similar lesions.

In closing, Kruse and Pasquale conclude that there are at least two quite distinct types of dysentery: the amœbic dysentery, which they have studied so carefully, which is especially prevalent in the tropics but occurs also in some parts of this country, in Italy, and in Bohemia, and the dysentery of the temperate climates, endemic in central Europe and in the United States and occurring also in epidemics. Of this last, two varieties are made according as the lesion is of a catarrhal or a diphtheritic nature. At present almost nothing is known of the etiology of the latter type.

Six excellent plates accompany this article, showing the structure of the amœbæ and their location in the various lesions.

ACUTE YELLOW ATROPHY OF THE LIVER.

It has long seemed probable that this peculiar and extensive degenerative process of the liver is dependent upon the action of some infectious agent upon its tissues. The rapid clinical history, febrile course, great prostration, and frequent occurrence of embolic processes in connection with the disease lend weight to this view. It is, therefore, of considerable interest that BABÈS (*Virchow's Archiv*, 1894, cxxxvi. 1) describes four cases of virulent streptococcus infection which ran the typical course of acute yellow atrophy. In three of the cases the streptococci were present in the liver as well as in other organs, and in two of these were found in enormous numbers, blocking many of the smaller vessels of the liver completely, and so presumably aiding in the production of the degeneration. Babès suggests that a liver already weakened by the existence of some chronic degenerative lesion may lend itself particularly easily to the destructive effect of the streptococci and of their poisons.

REGENERATION OF THE LIVER AFTER INJURY.

In the absence of PONFICK, Foà demonstrated two rabbits at the International Medical Congress at Rome, from which Ponfick had twenty days previously removed about three-fourths of the liver. The animals appeared to be perfectly well in every particular. They were then killed and their livers were shown to have grown to nearly the normal size. In connection with his previous experiments of this sort, Ponfick has shown that the regeneration of the liver results from a growth of new liver-cells, which help to form a tissue very similar to that of the original liver.—*Centralbl. f. allg. Path. u. f. path. Anat.*

SUPPURATION.

THE discovery by Ogston of micrococci in the pus of abscesses gave rise to the belief that suppurative inflammation was quite distinct in its nature from the more simple forms of inflammation, that it was a specific disease dependent upon a definite cause and not occurring without its agency. The researches of Koch into the infectious processes of wounds, and the more careful study of bacteria made possible by the use of solid culture media, however, disclosed the fact that several distinct species of bacteria were associated with pus-formation, and Koch consequently asserted that suppuration could not properly be considered a specific disease. Subsequent study has confirmed this opinion, and has demonstrated an etiological relationship to suppuration of a much larger number of bacteria than was at first supposed. The various problems connected with the occurrence of suppuration have thus become more complicated and have been the subject of much research during the past few years. The results of this study are carefully reviewed by KURT MÜLLER in a recent number of the *Centralblatt für Bakteriologie und Parasitenkunde*, 1894, xv., Nos. 19, 20, and 21.

While admitting that in a few instances inflammation with pus-formation has been produced experimentally without the agency of bacteria, Müller regards this to be of no practical importance, since suppuration as it occurs in man is unquestionably always the result of the action of micro-organisms. But the germs associated with suppuration are not the only factor to be considered in the study of its etiology, for the accumulation of the inflammatory products depends also upon the vital activity of the tissue upon which the influence of the germs is exerted.

The importance of the tissue in determining the occurrence of suppuration is shown by a number of circumstances. Thus, many germs occasionally producing suppuration, do not habitually do so, apparently only acting in this way when the state of the tissue is such as to react in an unusual way to their influence. The bacillus typhosus, the bacillus coli communis, and the micrococcus tetragenus are examples of germs occasionally acting to cause suppuration in this way. Again, it is not unusual to find inflammation of less intensity than the ordinary suppurative inflammation caused by the germs which usually cause suppuration in its most virulent form. The staphylococcus pyogenes aureus not infrequently causes simple serous inflammation (pleurisy with effusion), or may cause only areas of tissue necrosis at the points of its lodgment in the body. Another interesting fact bearing upon this question of the part played by the tissue in suppuration is that its susceptibility may change with great rapidity. A case illustrative of this is cited by Müller. A man who two weeks before had suffered from a suppurating wound of the finger, presented himself with diffuse infiltration and redness about the shoulder of the same arm. When incised a considerable quantity of serous exudate escaped, but no pus. Cultures of this serum showed only streptococci. The wound was dressed aseptically. In three days the man died, and at the autopsy the whole region previously occupied by a serous exudate was found to be infiltrated with pus, which still showed only streptococci. It would seem that in this case the tissues must have undergone a change of susceptibility.

A change of susceptibility is also observed with change in age of the individual. This is exemplified by "spontaneous" osteomyelitis which is comparatively rare after the twenty-fifth year. It is also strikingly illustrated in the case of rats, which while young are exceedingly susceptible to anthrax, but when adult show great immunity to it.

It is evident, then, that the condition of the tissues must exert an important action in determining the occurrence of suppuration.

The germs which have thus far been described as at times giving rise to suppuration are: *Staphylococcus pyogenes aureus*, *albus*, and *citreus*; *Streptococcus pyogenes*, *Staphylococcus cereus albus*, *Streptococcus cereus flavus*, *Micrococcus pyogenes tenuis*, *Micrococcus tetragenus*, *Pneumococcus*, *Bacillus pyogenes foetidus*, *Bacillus typhosus*, *Bacillus coli communis*, and *Bacillus pyocyaneus*. Of these the staphylococci, streptococci, and the pneumococcus are by far the most frequent causes of suppurative inflammation. To these Müller would add, and apparently with justice, the *Bacillus tuberculosis*, the *Gonococcus*, and *Actinomyces*.

Nothing can be more certain, then, than that suppuration cannot be regarded as a specific process. It results from the action of a great variety of micro-organisms which are profoundly influenced in this action by varying states of the tissues. It must, therefore, be considered as nothing more than an intense form of exudative inflammation in which peculiar conditions of bacterial activity, or of tissue susceptibility, or of both, lead to an inordinate emigration of leucocytes and necrosis of tissue.

STAIN FOR GONOCOCCUS.

LANZ (*Deutsche med. Woch.*, 1894, No. 9) advocates the following method of staining the gonococcus in the various secretions. A cover-glass preparation, made in the usual way, is immersed for from one-half minute to two minutes in a 20 per cent. solution of trichloroacetic acid and washed in water. It is then placed in the stain for from three to five minutes. This stain consists of 30 c.c. of water, 1 or 2 drops of a 5 per cent. solution of carbolic acid, and saturated alcoholic solution of methylene-blue in sufficient quantity to give the solution a deep blue color. After coming out of this stain the specimen is again washed in water, is dried, and is mounted in Canada balsam for examination. By this method the gonococci are said to be very clearly differentiated, as the color is prevented to a considerable degree from entering cells and other obscuring material by the previous soaking in the acid. Lanz says that very pretty pictures may be obtained by contrast-staining for a half-minute or so in Bismarck-brown.

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PERSISTENT ALBUMINURIA AND GLYCOSURIA, WITH
FREQUENT HYALINE CASTS, IN FUNCTIONAL
NERVOUS DISEASES.¹

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FOR many years, in the fear that I might overlook some lurking renal trouble, I have been in the habit of having examinations of the urine made in cases of neurasthenia and other cases of functional disease that have sought my advice; and in especial the difficulty of treatment of many of the neurasthenics has led me, within the past two years, to very careful testing with the hope that I might therefrom derive indications for a rational therapeutics. To this end I have been fortunate in enlisting the services of Mr. Albert Zimmerman, in charge of the laboratory of Mr. Horatio N. Fraser, who has entered with great enthusiasm upon the task, and spared no pains in details that have often been wearisome in the extreme. In this way there have been examined 31 cases of neurasthenia, 1 case of subacute mania, 2 of Raynaud's disease, 2 of hypochondria, 1 of *folie de doute* or mysophobia, 5 of melancholia, 4 of vertigo, 1 of lumbago, and, for reasons that will be seen farther on, 1 case of diabetes mellitus, 1 of spinal syphilis, and 3 of hemiplegia. In all of these cases tests have been made for albumin, sugar, urea, the phosphates, uric acid, calcium oxalate, casts, and indican; and in many of them the urine has been tested for nucleo-albumin from the bile, for serum-globin, fibrinogen, urobilin, and bile.

¹ Read before the New York Academy of Medicine, April 19, 1894.

Of the 31 cases of neurasthenia the following were the results:

In cases of one examination, heavy traces of albumin 13
 " " " " faint " " " 14

In cases of more than one examination:

In one albumin was first faint, then heavy, then none.
 In another " " heavy, " faint, " heavy.
 " " " " faint, " faint.
 " " " " heavy, " heavy.
 " " " " heavy, " faint, " none.
 " " " " faint, " faint.
 " " " " faint, " faint.
 " " " " faint, " faint.

In one case there was no albumin.

Albumin from bile . . . 6 Fibrinogen 2

Of these 31 cases of neurasthenia, the sugar was about:

0.10 per cent. in 16 0.05 per cent. in 8
 0.15 " " 7 0.03 " " 1

In the cases where there were heavy traces of albumin, the urea and the specific gravity contrasted as follows:

Urea.	Specific gravity.	Urea.	Specific gravity.
3.24	1.024	2.106	1.027
2.808	1.026	1.917	1.028
1.728	1.017	1.998	1.032
2.052	1.027	1.836	1.022
3.186	1.024	2.376	1.028
1.674	1.018	1.998	1.026
1.89	1.031		

In cases with faint traces of albumin, the urea and the specific gravity were as follows:

Urea.	Specific gravity.	Urea.	Specific gravity.
1.782	1.026	1.836	1.024
2.538	1.029	1.647	1.029
1.782	1.024	2.025	1.028
2.214	1.022	1.809	1.026
1.566	1.016	2.376	1.022
1.836	1.021	4.320	1.029
1.674	1.019	3.888	1.027
2.376	1.029	2.808	1.024
1.836	1.022	3.564	1.031
2.106	1.027	3.078	1.030
1.62	1.017	2.592	1.030
1.566	1.016		

In the 44 examinations of urine, in the 31 cases of neurasthenia, the uric acid, oxalate of calcium, phosphates, indican, and casts were:

Phosphates above normal 33	Casts, present 20
Normal 11	absent 24
Uric acid, above normal 44	Indican, above normal 43
Calcium oxalate, above normal . . 44	normal 1

Of these 44 examinations, 21 were of one case only. In 3 cases, three specimens were examined. In 7 cases, two specimens were examined.

In five cases of melancholia, one examination each, there were:

Albumin, heavy traces 2	Urea and specific gravity contrasted:
faint traces 3	faint tr. alb. 2.365 sp. gr. 1.025
from bile 2	2.052 1.024
Sugar, 0.10 per cent. 2	Calcium oxalate, normal 1
0.05 " 3	above normal 4
Urea and specific gravity contrasted:	Uric acid, above normal 4
heavy tr. alb. 2.592 sp. gr. 1.024	normal 1
2.00 1.030	Cast, few hyaline 4
faint tr. alb. 0.702 1.012	absent 1
	Indican, above normal 5

In two cases of hypochondria, four specimens examined, there were:

Albumin, heavy traces 1	Phosphates, above normal 4
faint traces 2	Uric acid, above normal 4
none 1	Calcium oxalate, above normal 4
Sugar, 0.10 per cent. 2	Cast, few hyaline 3
0.05 " 1	none 1
0.075 " 1	
Urea and specific gravity contrasted:	
faint tr. alb. 2.10 sp. gr. 1.029	heavy tr. alb. 1.89 sp. gr. 1.030
1.188 1.027	none, 1.975 1.029

In one case of *folie de doute*, four specimens examined, there were:

Albumin, faint traces 3	Phosphates, normal 1
none 1	above normal 3
Albumin, from bile 1	Uric acid, normal 1
Sugar, 0.10 per cent. 3	above normal 3
0.05 " 1	Calcium oxalate, normal 1
Urea and specific gravity contrasted:	above normal 3
faint tr. alb. 3.672 sp. gr. 1.026	Indican, above normal 4
3.78 1.027	Urobilin, slight 2
2.70 1.023	absent 2
no albumin, 3.726 1.025	

In two cases of Raynaud's disease, one specimen each, there were:

Albumin, heavy traces 1	Phosphates, normal 1
faint traces 1	above normal 1
fibrinogen 1	Uric acid, above normal 2
Sugar, 0.10 per cent. 1	Calcium oxalate, above normal 2
0.03 " 1	Urobilin, slight 1
Urea and specific gravity contrasted:	none 1
heavy tr. alb. 2.268 sp. gr. 1.022	Cast, few hyaline 1
faint tr. alb. 2.86 1.022	none 1

In three cases of insomnia, one specimen each examined, there were:

Albumin, heavy traces 1	Phosphates, normal 1
faint traces 2	above normal 2
from bile 1	Uric acid, above normal 3
fibrinogen 1	Calcium oxalate, above normal 3
Sugar, 0.05 per cent. 3	Cast, few hyaline 2
Urea and specific gravity contrasted:	absent 1
heavy tr. alb. 1.944 sp. gr. 1.024	Indican, above normal 3
faint tr. alb. 1.134 1.018	Urobilin, slight 1
1.458 1.010	absent 2

In one case of *petit mal*, one specimen examined, there were:

Serumglobin, faint traces	1	Phosphates, normal	1
Sugar, 0.10 per cent.	1	Uric acid, above normal	1
Urea and specific gravity contrasted:		Calcium oxalate, above normal	1
urea, 0.702 sp. gr. 1.009		Indican, normal	1
		Casts, absent.	1

In two cases of epilepsy, one specimen each examined, there were:

Albumin, heavy traces	1	Phosphates, normal	2
faint traces	1	Uric acid, above normal	2
serum-globin	1	Calcium oxalate, above normal	2
Sugar, 0.02 per cent.	1	Indican, above normal	2
absent	1	Casts, few hyaline	1
Urea and specific gravity contrasted:		absent	1
heavy tr. alb. 1.674 sp. gr. 1.017			
faint tr. alb. 1.242 1.012			

In one case of post-epilepsy, one specimen examined, there were:

Albumin, faint traces	1	Uric acid, above normal	1
Sugar, 0.05 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted:		Indican, normal	1
Urea, 1.836 sp. gr. 1.019		Casts absent.	
Phosphates, normal	1		

In four cases of vertigo, six examinations of urine; three in one, one each in three, there were:

Albumin, heavy traces	3	Phosphates, normal	2
faint traces	3	above normal	4
from bile	5	Uric acid, above normal	6
Sugar, 0.10 per cent.	5	Calcium oxalate, above normal	6
0.05 "	1	Casts, few hyaline	4
Urea and specific gravity contrasted:		absent	2
heavy tr. alb. 3.024 sp. gr. 1.029		Indican, normal	1
3.294 1.028		above normal	5
1.944 1.025		Urobilin, slight	4
faint tr. alb. 1.674 1.029		absent	2
2.16 1.027			
2.025 1.020			

In one case of lumbago, four examinations of urine, there were:

Albumin, faint traces	2	Phosphates, normal	1
heavy traces	2	above normal	3
from bile, faint traces	2	Uric acid, above normal	4
Sugar, 10 per cent.	2	Calcium oxalate, above normal	4
15 per cent.	2	Indican, above normal	4
Urea and specific gravity contrasted:		Urobilin, slight	4
heavy tr. alb. 2.052 sp. gr. 1.025		Casts, few hyaline	4
2.16 1.026			
faint tr. alb. 2.322 sp. gr. 1.028			
3.078 1.030			

In one case of neuritis, one specimen examined, there were:

Albumin, faint traces	1	Uric acid, normal	1
Sugar, 0.01 per cent.	1	Calcium oxalate, normal	1
Urea and specific gravity contrasted :		Casts, absent.	1
urea, 1.296 sp. gr. 1.012		Indican, normal	1
Phosphates, normal	1		

In one case of post-neuritis, one specimen examined, there were:

Albumin, heavy traces	1	Phosphates, normal	1
fibrinogen	1	Uric acid, normal	1
Sugar, 0.02 per cent.	1	Calcium oxalate, normal	1
Urea and specific gravity contrasted :		Indican, normal	1
urea, 1.728 sp. gr. 1.014		Casts, absent.	

In one case of rheumatic neuritis, one specimen examined, there were:

Albumin, faint traces	1	Phosphates, normal	1
Sugar, 0.05 per cent.	1	Uric acid, above normal	1
Urea and specific gravity contrasted :		Casts, absent.	
urea, 1.296 sp. gr. 1.014		Indican, above normal	1
Calcium oxalate, above normal	1		

In one case of hysteria, one specimen examined, there were:

Albumin, faint traces	1	Calcium oxalate, above normal	1
Sugar, 0.02 per cent.	1	Phosphates, above normal	1
Urea and specific gravity contrasted :		Indican, above normal	1
urea, 2.268 sp. gr. 1.022		Urobilin, slight	1
Uric acid, above normal	1	Casts, absent.	

In one case of nymphomania, one specimen examined, there were:

Albumin, faint traces	1	Uric acid, above normal	1
Sugar, 0.10 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted :		Indican, above normal	1
urea, 2.025 sp. gr. 1.020		Casts, few hyaline	1
Phosphates, normal	1		

In one case of neuralgia, one specimen examined, there were:

Albumin, very faint traces	1	Phosphates, above normal	1
Serum-globin, very faint traces	1	Uric acid, above normal	1
Sugar, 0.15 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted :		Indican, above normal	1
urea, 3.537 sp. gr. 1.025		Casts, few hyaline	1

In one case of torticollis, one specimen examined, there were:

Albumin, heavy traces	1	Uric acid, above normal	1
Sugar, 0.05 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted :		Indican, abundant	1
urea, 1.728 sp. gr. 1.020		Casts, few hyaline	1
Phosphates, normal	1		

In one case of tic douloureux, one specimen examined, there were:

Albumin, faint traces	1	Uric acid, above normal	1
Sugar, 0.02 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted :		Indican, above normal	1
urea, 1.566 sp. gr. 1.010		Urobilin, absent	1
Phosphates, above normal	1	Casts, absent	1

In one case of intra-cranial syphilis, one specimen examined, there were:

Albumin, heavy traces	1	Uric acid, above normal	1
Sugar, 0.15 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted:		Indican, above normal	1
urea, 2.214	sp. gr. 1.020	Casts, absent.	
Phosphates, above normal	1		

In two cases of spinal syphilis, one specimen each examined, there were:

Albumin, heavy traces	1	Phosphates, above normal	1
faint traces	1	normal	1
from bile, heavy traces	1	Uric acid, above normal	2
Sugar, 0.05 per cent.	2	Calcium oxalate, above normal	2
Urea and specific gravity contrasted:		Casts, abundant, hyaline	1
faint tr. alb. 1.782	sp. gr. 1.029	absent	1
heavy tr. alb. 1.404	1.028	Indican, above normal	2
		Urobilin slight	2

In one case of nervous syphilis, two specimens examined, there were:

Albumin, heavy traces	2	Phosphates, normal	2
fibrinogen	1	Uric acid, above normal	2
Sugar, 0.10 per cent.	1	Calcium oxalate, above normal	2
0.05 "	1	Indican, above normal	2
Urea and specific gravity contrasted:		Urobilin, absent	2
urea, 2.376	sp. gr. 1.019	Casts, few hyaline	2
1.82	1.017		

In one case of alcoholic meningitis, six specimens examined, there were:

Albumin, abundant	1	Phosphates, normal	3
faint traces	4	above normal	3
none	1	Uric acid, above normal	5
Sugar, 0.05 per cent.	2	normal	1
0.03 "	4	Calcium oxalate, above normal	5
Urea contrasted with specific gravity:		normal	1
heavy tr. alb. 2.025	sp. gr. 1.025	Indican, above normal	5
faint tr. alb. 1.512	1.022	normal	1
1.674	1.017	Casts, abundant hyaline	1
1.728	1.021	few hyaline	2
1.620	1.019	absent	3
no albumin, 2.279	1.019		

In one case of general paresis, one specimen examined, there were:

Albumin, faint traces	1	Uric acid, above normal	1
Sugar, 0.03 per cent.	1	Calcium oxalate, above normal	1
Urea and specific gravity contrasted:		Indican, abundant	1
urea, 1.458	sp. gr. 1.014	Urobilin, absent.	
Phosphates, normal	1	Casts, few hyaline	1

In three cases of hemiplegia, one specimen each examined, there were:

Albumin, faint traces	3	Phosphates, above normal	2
from bile, heavy traces	1	Uric acid, above normal	3
Sugar, 0.10 per cent.	2	Calcium oxalate, above normal	3
0.075 "	1	Casts, few hyaline	2
Urea and specific gravity contrasted:		absent	1
urea, 1.296	sp. gr. 1.014	Indican, above normal	3
2.484	1.031	Urobilin, absent	2
2.268	1.023	slight	1
Phosphates, normal	1		

In one case of subacute mania, two specimens examined, there were:

Albumin, faint traces	2	Uric acid, above normal	2
from bile, heavy traces	1	Phosphates, above normal	2
Sugar, 0.15 per cent.	1	Calcium oxalates, above normal	2
0.10 "	1	Indican, abundant	2
Urea and specific gravity contrasted:		Urobilin, slight	2
urea, 2.754	sp. gr. 1.026	Castis, few hyaline	1
2.916	1.028	absent	1

In one case of diabetes mellitus, five specimens analyzed, there were:

Albumin, faint traces	4	Phosphates, above normal	5
none	1	Calcium oxalate, above normal	5
Sugar, 0.10 per cent.	2	Uric acid, above normal	5
0.05 "	3	Castis, none	5
Urea and specific gravity contrasted .		Indican, above normal	5
faint tr. alb. 1.94	sp. gr. 1.030		
2.268	1.031		
1.944	1.031		
2.16	1.032		
no albumin, 2.118	1.029		

In most of these cases, therefore, albumin, sugar, excess of phosphates, oxalate calcium, uric acid, and indican have been found.

How are we to interpret these findings in the light of our present knowledge of the genesis of these different constituents of the urine?

The almost constant presence of albumin in heavy or slight traces has been of the most interest to me. It is a well-recognized fact that this substance is often to be found in the urine of normal individuals under certain well-known conditions. This has been shown by Jackson¹ to occur after cold baths; in the newborn;² in children and young people;³ in pregnant and nursing women;⁴ after muscular exertion and perspiration, and after meals.⁵ It is also well known that it occurs in many pathological conditions other than in nephritis, such as lipuria,⁶ chyluria, hæmoglobinuria, and from compression of the thorax.⁷ None of these causes have been present in my cases. I have, moreover, been especially careful in all these patients to look for the cardiac and arterial lesions characteristic of nephritis, and in many of them I have also tested the arterial pressure, and whenever I have found any of the former they have been excluded from these tables, whilst I have admitted some few instances of the latter who presented no other evidences of renal lesion. My tables may therefore be taken to consist of cases in which no nephritis was evident, except one choose to regard the albuminuria as such. I am very loath, however, to jump to this latter conclusion, because of the fact that the course of these cases is not that of any form of nephritis, as most of them are perfectly curable, as well as for the reason that the same amount of albuminuria is found in such other cases

¹ British Medical Journal, 1873.

³ Dohrn Monat. f. Geburtsh., Bd. xxix.

⁵ Zeitschr. f. Geb. u. Frauenkrkh., 1876.

⁷ Schreiber: Arch. f. exp. Pathol., 1885.

² Virchow's Ges. Abhndlng., 1856.

⁴ Martin and Ruge.

⁶ Ribbert: Virchow's Arch., Bd. xcviij.

of functional nervous disease as I have catalogued. In other words: either neurasthenia, *folie de doute*, hypochondria, melancholia, vertigo, with slight albuminuria, are cases of nephritis, or else slight albuminuria is merely an attendant symptom of these cases of functional nervous disease. The former proposition seems to me ridiculous, inasmuch as there is not the slightest proof of it, whilst the latter belief is at least tenable, because all the proofs so far attainable are in favor of it. Moreover, these cases of albuminuria are almost always attended by varying amounts of urinary sugar, which is not necessarily a concomitant symptom of nephritis. On the other hand, I cannot remember ever having seen a case of albuminuria in functional nervous disease pass into well-marked nephritis. Of course, this statement must be taken with some reservation, because, as I have already said, I have only had the urine of these cases thoroughly examined within the last two years; but, then, I have treated many hundreds of such cases of neurasthenia, and I think it is probable that my memory would not have deceived me had any of them ever passed on into any form of renal lesion. So far as I have seen, I believe that the renal diseases begin to show the arterial or cardiac symptoms very soon after the albuminuria is manifested, or indeed occasionally even before, whilst œdema is a frequent symptom when the disease has lasted for some time. In these particulars, therefore, the albuminuria which I am describing would seem to be of a different type of disease. For the last thirty years Semmola, of Naples, has been claiming that the albumin found in the urine in Bright's disease is a different kind of albumin from that which is found in other lesions, as, for instance, those of the heart; nor, from *a priori* reasoning and the facts which I have adduced, does this seem at all improbable. Indeed, in one of my cases I found that the albumin was albumose, and, as I have already said, such other albumins as fibrinogen and albumin from bile have been frequently encountered. It would be very tempting indeed for me here to pass into a digression on the researches of Meissner, Brücke, Schützenberger, Kühne, Neumeister, Chittenden, and others as to the action of the gastric juice and its constituents on the proteids, and to discuss with you what we know about parapeptone, metapeptone, hemiprotein, hemialbumin, antialbumid, anti-albumat, antialbumose, hemialbumose, anti-peptone, and all the varieties of the albumoses; but, aside from the fact that this would constitute a paper in itself, these distinctions are of no pertinency to this investigation except to the chemical investigator himself. I have only been able to obtain two communications of Semmola,¹ presented to the Academy of Medicine of Paris respectively in 1883 and 1887. In these two papers are contained a series of experiments upon dogs, showing that forced

¹ Nouvelles contributions à la Pathologie et au Traitement de la Maladie de Bright. L. Di Mariano-Semmola, Paris, 1883. Nouvelles Recherches expérimentales cliniques sur la Maladie de Bright, Paris, 1887.

alimentation with the white of egg produced first a congestion and then hemorrhage between and within the glomeruli, as well as between the glomerulus and Bowman's capsule; and, further on, a diapedesis of leucocytes upon the smaller tubes and between the uriniferous tubes, together with alteration of the epithelium of the tubes between the ascending loop of Henle and the straight tubes; whilst with still larger quantities of white of egg, molecular alterations extended throughout all the structures of the kidney. This is conclusive so far as it goes, but it only shows the effect of one form of albumin—that of the white of egg; but Stockvis has found that even this white of egg does not appear in the urine when it has been cooked before ingestion. Whether other kinds of albumin are capable of causing this implication of the kidney is a matter as yet unsolved, and these experiments therefore cannot be applied to the determination of the effect of the albumin which I have found in my cases, as this was certainly not an egg albumin. It is a significant fact in this connection that, until within the last ten years, none of the life insurance companies of Continental Europe have been in the habit of examining the urine of applicants; and yet their death-rates, so far as statistics are capable of showing, do not differ from those of the American companies, in which the urine is always carefully examined.

I have found Millard's test to be a much more reliable one than that by heat and nitric acid, inasmuch as I have frequently failed to find slight amounts of albumin by the latter when they have been found by the former; whilst, on the other hand, I have never failed to find albumin with heat and nitric acid when it had been demonstrated by Millard's test. It has frequently happened to me to have the urine of patients examined by excellent physicians without the finding of albumin, and yet I have been able to demonstrate it to myself conclusively; indeed, so often has this happened that I have grown to be very skeptical about the ordinary medical examination of urine. The explanation of this discrepancy to my mind lies in the fact that perfectly demonstrable slight or heavy traces of albumin can very readily be overlooked unless the test-tube is sparklingly clean and held in a proper light. I think, too, that we physicians have been so much accustomed to finding great flakes of albumin, or coagulated or heavy clouds, such as we see in advanced cases of nephritis, that we have grown to be careless in the determination of relatively smaller amounts. Nevertheless albumin is albumin, whether it fills the half of a test-tube or causes mere streaking that is only visible to the eye of a careful examiner. I have also asked myself whether, with such a delicate test as Millard's, albumin would not be found in every urine, and the more especially as Posner,¹ examining the urine of seventy healthy persons, found albumin

¹ Berlin. klin. Wochenschr., 1885, S. 1881.

almost constantly, although doubt, it should be borne in mind, has been cast upon these observations by Malfatti,¹ who shows that what was mistaken for serum-albumin was really mucin, coming from the mucous glands of the urinary passages. In about 20 per cent. of the cases, however, of various kinds which I have carefully examined with Millard's test, no albumin whatever has been found, whilst I can count up over a thousand cases that have been examined by other physicians by Millard's test, in which albumin was not found either, although, for reasons which I have detailed already, I should not insist upon the absolute accuracy of these latter examinations. In 1017 cases in which the urine was examined in applicants for life insurance, the results were as follows:

No albumin	863
Albumin found by heat test	24
“ “ “ Heller's No. 3	27
“ “ “ Tanret's test	43
“ “ “ Millard's test	45
“ “ “ picric acid	5
Total number in which albumin was found	144

The sugar which I have found in these urines has been determined by either Fehling's or the indigo carmine test. I have found the latter far the most delicate and reliable, and I now use it in all cases. That there is some close relationship between glycosuria and these cases attended with albumin and nephritis on the one hand, and true diabetes on the other, has seemed probable to me, from the following facts. First, a young man coming to me from a far Southern State had all the facial appearances of a case of diabetes mellitus, as well as the great thirst and the marked odor of the breath. Four examinations of the urine, at different times, showed heavy traces of sugar. I ordered him to go to a Western climate, whence he returned to me after a year's interval, and then I found that the thirst and the odor of the breath had disappeared entirely, whilst the sugar and albumin had vanished from the urine. Second, several of these individuals have presented the blanched *facies* characteristic of renal disease just before the time when œdema of the lids is prone to appear.

These cases which I am describing are probably the cases which have postured for many years in medical literature as those of lithæmia. In other words, I believe that most, if not all, cases in which there is an excess of uric acid in the urine will be shown to present traces of albumin and sugar, provided the patient has shown symptoms of ill-health. I am not prepared to say, however, that excess of uric acid alone will cause ill-health, or that there may not be cases of excess of uric acid in the urine without albumin and sugar. The whole question

¹ Internat. Centralbl. f. Phys. u. Path. d. Harnorg., 1889.

of the formation and the import of uric acid seems to me to be as far from solution as ever. The two great theories to-day are those of Haig and Sir William Roberts, and they are diametrically opposed. Haig,¹ who has written so charming a book on the rôle of uric acid in disease that one is really disappointed in finding any logical objection to his conclusions, maintains that he has estimated for six years the uric acid which he himself excreted, and that the relation of uric acid to urea is about 1 to 30.5, varying to 1 to 0.35 or even 1 to 0.38, the mean being about 1 to 0.33. He also quotes Yvon² and Berlioz as finding that the relation was about 1 to 0.30 or 1 to 0.40, whilst Lecanu (this is quoted from Sir Dyce Duckworth, *A Treatise on Gout*, p. 20) found the relation to be 1 to 0.33. This uric acid, however, is excreted in varying quantities from day to day and hour to hour, and Haig explains this by the alternation of acidity and alkalinity of the urine, accompanied, he claims, by similar acid and alkaline conditions of the blood. Thus, when the urine and blood are alkaline the uric acid is held in solution and dissolved out of the various tissues of the body, whilst acidity of the urine and blood drive the uric acid back into the different tissues. As Garrod has shown that there is a so-called acid and alkaline tide of the urine, the alkalinity being greater during the day and the early morning, and the acid at its highest during the afternoon and at night, Haig attempts to show that the early day and the morning are the times when the uric acid is held in solution in the blood and urine, and, passing through the system, causes all the ill symptoms incident to such a condition, whilst comparative ease and comfort are obtained in the afternoon and evening as the blood becomes more acid and the uric acid no longer circulates throughout the system. Upon these explanations Haig bases a number of clinical and pathological conclusions. Thus, if the excretion of uric acid falls below what he considers the average amount, the surplus must be hidden away somewhere in the tissues, and this surplus can be brought again into the blood and thence into the urine by drugs or by certain febrile, dietetic, or medicinal means. Haig himself has been a lifelong sufferer from migraine, and he believes that he has obtained very great relief by putting himself upon a diet consisting of milk, eggs, fish, fowl, game, vegetables, fruits, and tea, coffee, or cocoa in moderation. He claims, moreover, that the medicinal substances increasing the excretion of uric acid are alkalies, salicylic acid and its compounds, salicin, salol, and other compounds of this class, such as phosphate of soda, piperazidin, and quinine, whilst the chief substances diminishing the excretion of uric acid are acids, iron, lead, lithia, manganese, calcium chloride, acid phosphate of soda, some sulphates, chlorides, etc., and many substances which directly or indirectly cause the acidity or

¹ A. Haig: Uric Acid as a Factor in the Causation of Disease. 1892

² Revue de Médecine, September, 1884.

otherwise form insoluble compounds with uric acid, as opium, cocaine, mercury, antipyrine, caffeine, the nitrites, some hyposulphites, and strychnine. The most valuable of the excretants he considers to be the alkalies, salicylic acid and its compound form, salicyluric acid. He points out that phosphate of soda, although a valuable excretant, can only act in an alkaline medium, or while the supply of alkalies is abundant, as the presence of any acid or even of a salt of a mineral acid, as a sulphate, appears to convert it into the acid phosphate when there is no longer a plus excretion of uric acid—so that the phosphate of soda should be given with alkalies. Salicylates, on the other hand, act best when the alkalinity is low, and their action as regards the excretion of uric acid appears to be absolutely hindered by the presence of alkali, so that they do best in conditions of fever, when the alkalinity is generally low, and in conditions where there is little or no fever it may be necessary to give them with opium or ammonia, which raise the acidity, or in alternate doses with acids to obtain their full effect on the excretion of uric acid. Piperazidin appears to have little effect upon the excretion of uric acid, and is also impaired in its effect by acids. Upon this basis of commingled facts and theories Haig blazes a path into many obscure phenomena of disease, very much to his own satisfaction. Unfortunately, however, many of his arguments are pure theory, and of his clinical data, although I have tried to verify several of them, there is only one which has been confirmed by my own experience, namely, that a strict observance of his theory about the action of drugs will do more to modify the suffering of migraine than any therapeutic procedure which I have tried in a medical life of twenty-one years. I have found that case after case of migraine will be benefited by the administration of twenty drops of nitro-muriatic acid before meals, and three to five grains of the salicylate of soda after meals; and modified, too, in such a way that the attacks of migraine have in several instances disappeared for months, and even then, returning, are very much less severe than formerly. His restriction of the diet I have frequently tried in former years without the slightest effect, although my experiments at that time were open to the objection that I was not acquainted with his medicinal hints; but I have not been willing to try it again with my patients, because restriction of nitrogenous diet is, in my experience, a very dangerous thing for the man or woman who has this world's work to do, inasmuch as it diminishes their well-being seriously, and thus limits their output of energy. Haig himself admits that there is some force in this objection, because he especially cautions against a sudden reduction of nitrogenous food. I might have been willing to try again the more gradual and systematic reduction of nitrogenous material as food, had not the examinations which I am describing to-night of the urines of different patients, caused me to think that in all

these cases of mine, and possibly even in Haig's, we had to deal with an increased excretion not only of uric acid, representing one of the terminal forms of nitrogenous diet, but also with albumin and sugar, representing respectively another nitrogenous excretion as well as one of the hydrocarbons. Moreover, in the "Croonian Lectures" for 1892, Sir William Roberts has a theory of uric acid which is diametrically opposed to Haig's, and the one is quite as well supported as the other by seeming facts. Let me ask your attention for a few minutes to Sir William Roberts' almost revolutionary propositions. As is well known, uric acid is regarded by chemists as bi-basic, *i. e.*, as an acid containing two atoms of replaceable hydrogen represented by the formula $H_2(C_5H_2N_4O_3)$, or more simply as H_2u . It forms, like every bi-basic acid, two regular areas of cells, namely, neutral urates with the M_2u , and acid urates or bi-urates with the general form MHu . The neutral urates cannot exist in the living organism, as they can only be produced in the presence of caustic alkalies and in the absence of carbonic acid and the carbonates, and Sir William Roberts therefore dismisses them from consideration. The bi-urates, on the other hand, are sparingly soluble in water, but are not decomposed thereby; and when such solutions are evaporated, the bi-urates are again deposited unchanged. They are never seen as a deposit in the unchanged urine either in health or disease; but when the urine undergoes ammoniacal decomposition the ammonium urate may occasionally be detected in the sediment as minute elongated dumb-bells, mixed with the amorphous phosphate of lime and the ammonia-magnesian phosphate, which constitutes the ordinary sediment of decomposed urines. Although these bi-urates are salts of uric acid, Sir William Roberts contends that there is no proof that uric acid ever exists as a true bi-urate in solution in the normal urine, and he introduces evidence to show that when these bi-urates are artificially introduced into the normal urine they fail to maintain their integrity, and at once undergo a change of composition; nor does he deem that there is any actual proof that uric acid ever exists as a true bi-urate in the healthy blood and interstitial juices. Nevertheless, it is susceptible of proof, in his opinion, that in certain abnormal circumstances bi-urates can and do arise under conditions which habitually prevail in the living body; thus, artificial solution of uric acid in healthy blood-serum will ultimately give rise to the production of crystals of sodium bi-urate. The word "ultimately" should here be emphasized, because uric acid does not at first enter into solution in blood-serum as true bi-urate, but this state of combination is slowly developed and gradually obtained after a certain lapse of time. He admits, however, that uric acid in some form of combination or other does exist normally in minute quantities in healthy blood, and he attempts to solve the question as to what this form of combination is. First, he demonstrates the identity of the

amorphous, solid, or semi-solid urinary deposit with the urinary secretion of birds and serpents. He calls attention to the researches, away back in 1862, of Dr. Bence Jones, who had shown that the action of water on the amorphous urate deposit and kindred compounds is to split them up into free uric acid and the bi-urates contained in them; but if this theory were correct, the quantity of uric acid thrown out by water should, of course, exactly equal the quantity retained in the solution as bi-urate. This was precisely what Bence Jones failed to demonstrate. Continuing the investigation onward from this point, Sir William Roberts has apparently proved that there exists a third order of uric acid salts differing essentially from the two urates already known, and having a composition corresponding to the hypothetical formula of a quadri-urate, the form of which would be $H_2(C_5H_2N_4O_3)MH$ ($C_5H_2N_4O_3$), or, he says more simply, H_2u, MHu . These quadri-urates present themselves usually as amorphous powders, but the spheres of birds' and serpents' urine are distinctly crystalline and display a black cross. These forms are permanent if kept perfectly dry; they readily assume a gelatinous modification, and when examined under the microscope in this state appear as large, translucent globules. They are extremely unstable, and they tend to change in two opposite directions. In weak solutions of the alkaline carbonates or the bi-metallic phosphates they slowly take up an additional atom of the base and are converted into bi-urates. On the other hand, in water and in watery solutions of the neutral salts they are split up into free uric acid and bi-urates. These two actions cover the behavior of the quadri-urates in the blood and the urine respectively, and furnish a key to the chemical processes which culminate in the formation of gouty deposits and calculous concretions. The only proper solvent for the quadri-urates is the healthy urine. In acid urines they dissolve freely with the aid of heat, and are again precipitated unchanged on cooling. Such solutions are, however, not stable; after a time their uric acid is slowly and at length completely liberated. The quadri-urates are still more freely soluble in hot alkaline urines, and in these media they continue perfectly unaltered and guarded against septic changes. When such solutions are made at boiling heat, they throw down on cooling bulky deposits which are identical with the natural amorphous urate sediment. From these experiments, therefore, Sir William Roberts draws the conclusions: first, that free uric acid is not known physiologically either in the body or the urine, but clinically and pathologically as crystalline sediments in the urine and as gravel and calculus in the urinary passages; second, that the neutral urates are not known physiologically or pathologically, but only as laboratory products; third, that the bi-urates are known pathologically as components of gouty concretions in the tissues, and only in the urine after the secretion has undergone ammoniacal fermentation, whilst it is

doubtful if they ever exist physiologically in the blood or tissues; that the quadri-urates are especially the physiological combinations of uric acid, existing normally in the urine and probably also in the blood—the latter constitute the entirety of the urinary secretion of birds and serpents—and all the morbid phenomena due to uric acid arise probably from secondary changes in the quadri-urates. He adds to this that “These considerations point to the idea that the residuum of uric acid in mammalian urine may be something in the nature of a vestigial feature—something analogous with the vermiform appendix, the ductus arteriosus, or the ear-point. These residuary structures are now regarded by biologists as indications of the line of ontological descent. On this view the presence of uric acid in the mammal’s urine should be regarded as a memory of some ancestral form which eliminated its nitrogens as uric acid. The extreme inconstancy of uric acid, both in regard to its presence and proportion in the urine of different species, and in different individuals of the same species, agrees perfectly with this theory, for vestigial structures are remarkable for their inconstancies.” This author is inclined to regard the fact that uric acid (gravel) is constantly seen as an independent disorder without disease of the stomach or liver, or general constitutional vice, in persons who are in all other respects perfectly healthy, as a vestigial or atavistic relic. Sir William Roberts also considers the effect of the precipitation of uric acid in the urine, of the degree of urinary pigmentation, the proportion of salines, the percentage of uric acid, and, above all, the grade of the acidity of the urine; but I have not space enough at my command to do more than to say briefly that he considers the deficiency of pigment as undoubtedly a factor, but is not able to offer any therapeutic suggestions to meet it; that as to the saline matters, he advises that the patient’s food contain an adequate proportion of articles rich in such substances, *i. e.*, meat, fish, eggs, and salads; that he regards excessive acidity of the urine as an important factor in the precipitation of uric acid, most likely to occur during the time of sleep, and advises for this purpose the administration of the citrate or bitartrate of potash and soda, the former being the best preparation, to be administered at bedtime, 40 to 60 grains dissolved in three or four ounces of water. He moreover believes that, as each meal acts on the urine as a dose of alkali, frequent meals are desirable. He deprecates the use of mineral waters of any kind as being no more efficient than equivalent quantities of distilled water would be.

Thus, as you see, we are met by two widely differing theories. Haig supposes that uric acid is formed day by day in the blood and thence passes into the urine, whilst Roberts maintains that the uric acid is held in solution almost entirely as a quadri-urate and is only precipitated as uric acid in the kidneys, the ureters, or the bladder, at the same time that the constant amount of uric acid in the blood is very small and is

only a vestigial remnant. The former assigns to uric acid a large primary rôle, whilst the latter regards it as a factor which only becomes important in certain conditions inducing changes localized in the peripheral parts of the urinary apparatus. When these differences of opinion between two competent observers are taken into consideration, together with the albuminuria, glycosuria, and indicanuria which I am describing in my cases, the inference is unavoidable that large amounts of urinary uric acid are by themselves of slight importance, probably constituting only one of a group of urinary phenomena.

The indican which has been found in these cases has not been constant. Even whilst it has generally been present in cases of digestive disturbance, this has not always been the case. In examining these patients and in looking over the histories, I have always had in mind the series of brilliant and original articles by Herter, and I have endeavored in every way to trace the relationship between the indicanuria and intestinal disturbances. But I have finally come to the conclusion that the indican, like the uric acid, is only part of a general disturbance of metabolism, and that the decomposition, as represented by indican, of the proteids under the influence of bacterial action cannot be studied alone.

Urobilin is also a substance which has not been constant. At first I thought that it would bear some relation to anæmia, but this has not been evidenced in my cases, for neither the facial aspect, nor examination of the heart for anæmic murmurs, nor testing the blood by the hæmoglobinometer has demonstrated any lack of corpuscles in some cases where the urobilin was present, although urobilin was found in several in which anæmia was demonstrable. Several cases in which urobilin existed were slightly jaundiced, and the urobilin, therefore, may have been a transformation in the urine of normal bile-coloring matter.

The hyaline casts that have been occasionally found have been a source of considerable solicitude to me, because I am well aware of how often other substances are mistaken for them. Repeated examinations, however, verified in every possible way, have shown me that the observations in this respect are accurate.

From these cases and these examinations, therefore, it would appear that most cases of neurasthenia and many cases of functional nervous disease will show, with precise examinations, slight amounts of albumin, sugar, excess of uric acid, occasionally hyaline casts, whilst the excretion of urea is about normal. In other words, these cases excrete abnormal amounts of the terminal products of nitrogenized and hydrocarbonaceous metabolism. What becomes of the fats I do not know, unless, as is probable, they pass off through the lungs in the form of carbonic acid. It is probable that these delicate tests show greater amounts of sugar, albumin, uric acid, and hyaline casts in certain conditions than are found in states of health, although I have had many analyses made

in which none of them have been found. For these reasons I have believed that the following conclusions are justifiable:

1. Many functional nervous diseases, especially neurasthenia, can constantly or well-nigh constantly be accompanied by albuminuria, glycosuria, excess of uric acid and oxalate of lime, and occasionally by excess of urea, indican, and hyaline casts.

2. It is probable that these urinary products are results rather than causes of disease.

3. These conditions very probably represent what has been called lithæmia.

4. It is probable that many, if not most, of these cases are not cases of early nephritis.

5. It is possible that there are different albumins in the urine, and that upon the determination of these will rest the future diagnosis of nephritis from other diseases.

The treatment of these cases is not as yet, in my opinion, a satisfactory one. By this I do not mean to say that most of them cannot be cured, but that our present method of treatment must be prolonged, precise, and of a kind that interferes seriously with the patient's ordinary occupation. Evidently the increased metabolism that is indicated by these urinary findings must be either the result of nervous derangement, localized derangement of some one organ or set of organs, or some error in the chemical nature of the food-supply. The latter theory has been, and is to-day, the popular one in the medical profession. But it has only a very slight basis of fact, as a careful perusal of physiological treatises will show. It is true that we have an idea of the main actions of the digestive fluids, but we are far from having an accurate knowledge of all the chemical transformations taking place in the stomach and duodenum, influenced by the presence of the living tissues surrounding them. It sounds very commonplace to say that the reaction of an isolated digestive fluid in a test-tube is something very different from the capabilities of that same digestive fluid in its proper place and modified by its fellows and all the wondrous mechanism of Nature. If one will read through such careful text-books of physiology as the latest editions of Foster and Arthur Gamgee, this truism will become more apparent. Yet to day millions of capital are invested in manufacturing firms upon the blind faith that physicians seem to have in the accuracy of their knowledge of digestion and assimilation. In the cases which I have been describing I have not found any advantage from any one system of diet. I have tried the exclusion of nitrogenous material, then the avoidance of the hydrocarbons, then total abstinence from sugar, all without any avail, except that in certain cases a temporary reduction of the proteids has been of very perceptible advantage for the time being. In all the cases, however, in which there was a melancholia or

hypochondria, or epilepsy, or vertigo, or neuralgia, I have not found that diet had the slightest influence upon the nervous symptoms. I do not, therefore, believe that the urinary products are due alone to error in the food-supply. On the other hand, I have again and again seen cases of neurasthenia and melancholia recover after proper treatment of the nervous symptoms, and then the albuminuria and glycosuria would gradually disappear. I think that I am therefore warranted in concluding that the nervous disease is the cause of the altered metabolism in these cases. For therapeutic purposes I think that all these cases can be divided into three classes: First, cases without mental or nervous symptoms or intestinal disturbances; second, cases with intestinal disturbances, with or without mental or nervous symptoms; third, cases with marked mental or nervous symptoms.

1. The light cases without mental or nervous symptoms or intestinal disturbances are best treated by nitro-muriatic acid, twenty drops in a wineglass of water three times a day after meals; or in some instances Haig's prescription, of nitro-muriatic acid before and from two to five grains of salicylate of soda after meals, will answer best. I do not think that larger doses of the salicylate of soda are beneficial; indeed, I seldom go beyond two grains, for more than this is apt to depress the patient. Laxatives should be used gently and carefully in all these cases. Usually I have found Rochelle salt to be sufficient—a drachm in a tumbler of water before breakfast; but it is a great mistake to use the larger doses up to a half-ounce that are often advocated. Sometimes it will be well to use a few small doses of calomel before commencing with the Rochelle salt, say two grains at bedtime for one or two nights, or one-tenth grain given every hour for five hours, and followed next morning by the laxative. Where the constipation is very obstinate I have found that one-tenth grain of aloin once, twice, or three times daily will be quite effective, and if it acts too precipitately it can be combined with advantage with two grains of the extract of cascara sagrada.

2. The cases in which there is intestinal disturbance may be subdivided into two classes: those in which there is intestinal disturbance alone, and those in which this is accompanied by mental or nervous symptoms. In both, the intestinal disturbance should be mitigated, if it be possible to do so, but in the cases with mental or nervous symptoms, the relief of the intestinal symptoms will not be sufficient, and can very often not be accomplished until the mental or nervous symptoms have been relieved. For the intestinal disturbance I have long given up the use of pepsin, as I believe that it only relieves temporarily, and its continued use will often aggravate. Sometimes pancreatin, in a combination that I shall speak of shortly, will act for a short time very beneficially. My patients have derived much more benefit from the subgallate of bismuth, salol, calomel, subnitrate of bismuth, codeia, lauda-

num, and salines. Of all these I believe that the subgallate of bismuth and salol are the most effective, in doses respectively of 5 and 2 grains three times a day. It is usually advantageous, however, to preface their use with a few doses of calomel in the manner that I have already described. In certain instances of great discomfort after meals, 5 or 10 grains of the subnitrate of bismuth will act like a charm, but it is not a reliable remedy. Where there is continued pain in digestion that cannot be relieved by these measures, moderate doses of codeia, $\frac{1}{4}$ to $\frac{1}{2}$ of a grain, three times a day, will be found to be very beneficial, or if this does not answer, 5 or 10 drops of laudanum may be substituted. These opiates, however, should never be continued very long, in my experience. In all cases, however, care should be taken to have one or two easy movements of the bowels daily, and this can be best attained by the methods already described. Naphthol, beta-naphthol, and guaiacol have not done well in my hands; I have not found them to compare in efficacy with the drugs I have just mentioned.

3. The cases in which there are nervous or mental symptoms with or without prostration, must be treated from an entirely different standpoint. The laxatives and digestives alone will often greatly aggravate the disease, and in this class of cases calomel is an especially dangerous remedy, for I have a number of times seen its use in melancholia followed by a violent outbreak. Rest, or more properly speaking, restriction of the expenditure of energy, is a *sine qua non* in the treatment of these severer cases. The principle of the rest treatment as advocated by Dr. Weir Mitchell is invaluable in these individuals, but the application that he makes of it I do not consider to be always judicious. Absolute and prolonged rest in bed is not necessary in cases of neurasthenia. I have seen many neurasthenics put on their feet after eight to twelve weeks of rigid rest treatment so ruddy and fat that it was a matter of painful surprise to find them incapable of more than slight exertion for weeks or months. This has led me to seek for modifications of Dr. Mitchell's plan. I have reluctantly abandoned massage; in the first place, because I believe that in many cases of neurasthenia it actually prolongs the weakened condition, whilst I have seen it aggravate cases of melancholia. Even in the severest cases I have found it quite sufficient to put the patients to bed for a few days or a week, then have them up and about in the afternoon, then simply stay in bed until ten in the morning and go to bed by eight or nine at night; whilst in the lighter cases the interdiction of walking, lying down for a few hours on a lounge each day, and getting long hours of sleep, may be all that is necessary. By these methods patients never lose the use of their muscles. They simply become somewhat more incapable of exercise, and that is easily rectified when the time comes. In cases of melancholia it is almost impossible to keep the patient in bed, as the morbid introspection renders

the quietude well-nigh unbearable, although, when rest can be obtained, it is always beneficial. Next to the enforced rest, I have found that the ingestion of large, what would often seem to be surplus, quantities of food is most important. This must, however, be done systematically, and day by day the food should be prescribed in increasing amounts until, at the end of ten days or two weeks, three full meals a day and a quart of milk should be taken in the twenty-four hours. In some cases of melancholia the aversion to food is so great that proper alimentation becomes a serious difficulty. When this is the case, I have always found that a threat of feeding by the stomach-tube was all that was needed, inasmuch as patients dread this and will compromise on any terms rather than have it. I have often, however, been forced to actually proceed as if I were about to carry out my threat, but in no single instance have I really had to do it, as the sight of the tube has been sufficient. Rest and surplus alimentation are usually of basic importance in these cases, but they will not do everything. In melancholia the careful and systematic use of opium and hypnotics is unavoidable; and in neurasthenics, iron, malt, and cardiac stimulants (the best of which is strychnine) are necessary. Properly (that is, systematically and vigorously) treated, these cases are of excellent prognosis. Left to run their own course, however, they are exceedingly chronic and apt to leave a condition of invalidism behind them.

In order to avoid interruption of the text, I have thought best to add the chemical methods which have been employed for the different substances as an appendix.

MILLARD'S AND TANRET'S TESTS AS ALBUMIN REAGENTS.

Tanret's.

Potass. iodide	3.32 grammes.
Mercury bichloride	1.35 "
Acetic acid	20 c.c.
Distilled water q. s.	100 "

Millard's.

Carbolic acid	f 5ij.
Glac. acetic acid	5vij.
Solut. potassa	5xxij.

ALBUMIN. (*Serum albumin, serum or para-globulin, nucleo-albumin from bile, mucin from bile, mucin from mucous membrane.*)

Clarifying.—To about one ounce of the urine add about 60 grains of powdered French chalk, shake together, pour upon a four-ply wetted paper filter; throw away the first portion of the filtrate; return the following portions until the urine passes perfectly clear. When the specimen is in an advanced state of mucus fermentation, in which the mucus is so minutely subdivided by the increased number of bacteria that it cannot be clarified by the above method, then the addition of caustic potassa or soda to strong alkaline reac-

tion without heat, followed by filtration through a wetted double paper filter, will clarify it. It will be necessary to return the filtrate several times before it passes perfectly clear.

The filtered specimen is divided into three-quarter-inch test-tubes, filling them about one-third full. To the first add 15 drops of Tanret's test; to the second 15 drops of Millard's test; to the third 15 drops of acetic acid. The reaction should be acid in all the tubes. Heat the three tubes to the boiling-point, and while the contents are hot hold them up to a good light, with a strip of black paper or card-board a short distance back of them, about half the way up to the level of the fluids, and note the results. Set aside for thirty minutes, and again heat to the boiling-point and note the results a second time. It is important that this length of time elapse before noting the last result, as minute quantities of albumin require this length of time for complete precipitation. The results should be noted directly after heating to the boiling-point, as one of the reagents precipitates all the alkaloids, peptones, and ptomaines, the other only a few of them, the precipitates of these bodies being retained in solution while hot; consequently they do not interfere with the albumin reaction.

The tube to which the acetic acid has been added is best held between the tubes containing the other reagents, any change in reaction being more easily perceptible. The acetic acid is used in addition to the reagents to detect soluble and dissolved mucin, combined acids of oleoresins, combined fatty acids, and other bodies yielding precipitates in acid media. The albumin reagents all being used in acid media, form precipitates when such substances are present; thus the acetic acid prevents any errors which may otherwise arise.

If albumin be present there will be an increased cloudiness or precipitate in the tubes to which the Millard's and Tanret's tests have been added. When very faint traces are present the opalescence produced, being distributed throughout the liquid, is more easily perceptible than the results obtained by applying the zone or contact test; the reagents being free from color, and the urine also deprived of considerable coloring matter by filtration through the French chalk, gives greater delicacy to the reaction.

When the specimen is acid and the reaction by Millard's test is more decided than that by Tanret's and acetic acid, being least by Tanret's, it shows the presence of mucin from bile and the nucleo-albumin from bile. This mucin appears to be the only soluble form of mucin found in acid urine, and with it is always to be found the nucleo-albumin, the mucin from the mucous membrane being soluble only in alkaline urine. The reason the Millard's test gives this increased reaction is that it is a more delicate reagent for mucin than either acetic acid or Tanret's test.

When the reaction is more decided in the tube containing the acetic acid than it is in the tubes to which the Tanret's and Millard's tests have been added, and no foreign bodies are precipitable by acetic acid, it shows the presence of serum or para-globulin.

When serum albumin alone is present, the reaction is indicated in the tubes containing the Millard's and Tanret's tests, acetic acid giving no reaction unless mucin be present, as in alkaline urine or in specimens which have been treated with alkali for clarification, when the source is the mucous membrane, or in acid specimens when it is derived from the bile. When mucin is present in solution from either source the Millard's test always gives a more increased reaction than the Tanret's test or acetic acid, being much more decided in the tubes containing the acetic acid and the Millard's test.

When any of the other forms of albumin are present with the serum albumin, the specimen is best treated with one-fourth its volume of glacial acetic acid, heated to boiling, set aside for one hour, then filtered through French chalk as above directed. This separates mucin from bile and mucous membrane, serum-globulin, and foreign substances, there being retained in solution serum-albumin and the nucleo albumin from bile, and these may readily be differentiated by adding ferrocyanide of potassa to the acetic acid solution, with-

out applying heat; the ferrocyanide being a more delicate reagent for the nucleo-albumin than either Tanret's or Millard's tests, yields a heavier reaction.

SUGAR.

Water, 1 drachm; copper solution, 10 drops; alkaline tartrate, 10 drops; heat to boiling, continue heat for one minute; if no change has taken place it shows the solution to be reliable. Add now 10 drops of the urine, heat again to boiling, continue the heating for one minute; set aside for ten minutes; if no reaction by separating suboxide of copper, it shows the sugar to be present below 0.10 per cent.

To show the presence of less than 0.10 per cent. sugar in urine, it is necessary to use the indigo-carmin test, consisting of two separate solutions; a 0.2 per cent. solution of sodium-indigo sulphate in acidulated distilled water in the one, and the other a 25 per cent. aqueous solution of crystallized sodium carbonate, used by adding 5 drops of the sodium-indigo sulphate solution to a drachm of the sodium carbonate solution, heat to boiling, when the solution will acquire a green color. Add now 10 drops of the urine, heat again to boiling, and keep the fluid as near this temperature as possible without ebullition for one minute, by holding the tube in the flame withdrawing and successively replacing it at short intervals. If sugar is present, the color will pass from green to violet, purple, red, and finally straw-color, which remains without further change in color, the latter color being the indication for the presence of sugar. By shaking the tube to admit oxygen of the air and cool the fluid, the colors will return in the inverse order to that which they appeared. By this method urine containing 0.01 per cent. sugar will change the test to a red, while 0.02 per cent. changes it slowly to the straw-color; the greater the proportion of sugar the more rapid will be the change to yellow, and from the degree of rapidity with which this change in color takes place, the proportion of sugar may be approximately estimated.

URIC ACID.

Taking 0.01 per cent. as normal standard.

To a definite portion of the filtrate from the phosphate test, add a concentrated solution of nitrate of silver until the mixture becomes deep gray or black, set aside for fifteen minutes; add half a volume of stronger water of ammonia, set aside, allow precipitate to subside, and pour off as much of the clear liquid as possible; again add an equal volume of stronger water of ammonia to the residue mixture; set aside for half an hour and note bulk of the precipitate and compare it with a standard volume or bulk obtained as an average from several specimens containing the above amount.

The uric acid is precipitated as silver urate.

If urates or free uric acid have separated as a precipitate, they are re-dissolved by adding a slight excess of solution of caustic soda to the specimen previously well shaken, diluting with half a volume of water, making neutral with dilute nitric acid; then proceed to precipitate the phosphoric acid as directed under phosphates. Keep the volume of the fluid double that of the urine.

Meat diet very acid by acid phosphates crystallizes uric acid and retains the oxalate of calcium in solution.

Carbohydrate diet, faint acid by acid phosphates, sometimes alkaline by alkaline phosphates, crystallizes oxalate calcium and retains uric acid in solution.

The acidity of the urine is reduced by the acid fermentation (lactic and butyric) of the carbohydrates, forming lactates and butyrates, which, like citrates and acetates when administered, reduce the acidity of the urine. And these acids (lactic and butyric), like some of the constituents of meat under impaired oxidation, instead of being oxidized to carbonic acid as they are normally, yield intermediate products of oxidation, as oxalic acid for example.

With few exceptions, as the proportion of uric acid increases, the indican reaction becomes more intense.

INDICAN.

Jaffe's Test.

To concentrated hydrochloric acid (3j) add a minute quantity of chlorinated lime; then add one-quarter of a volume of the urine; if the chlorinated lime is added to excess the color will be destroyed, if not in sufficient quantity the reaction will be faint. With few exceptions, the indican is increased as the uric acid rises in proportion.

UROBILIN.

100 c.c. of urine, shaken with 50 c.c. ether, the ether separated, evaporated without heat, the residue dissolved in alcohol and examined by micro-spectroscope.

OXALATE CALCIUM.

Taking 0.005 per cent. as a normal standard.

100 to 200 c.c. of the urine previously well shaken, add from 5 to 10 c.c. of a 25 per cent. solution of calcium chloride, add ammonia to alkaline reaction, shake well, neutralize by acetic acid, set aside for twenty-four hours; separate precipitate by filtration, wash with water, wash with hot solution of soda, then again with water, until the filtrate shows no perceptible reduction with permanganate of potassium; allow to drain, dissolve the residue in dilute sulphuric acid, washing the filter carefully with the dilute acid, heat the filtrate to near boiling-point, and titrate with $\frac{1}{10}$ permanganate; each c.c. = 0.0054 calcium oxalate.

BILE.

Huppert's Method.

To 2 ounces of urine add about 2 drachms of milk of lime—shake well—separate precipitate by filtration, transfer to test-tube, add alcohol and concentrated sulphuric acid; upon heating, the alcohol acquires a green-yellow color.

PHOSPHATES.

Taking 0.20 per cent. as a normal standard.

Dilute the urine with an equal volume of water; to one-half ounce of the mixture add two drops of a 25 per cent. solution of magnesium sulphate, then four drops of stronger water of ammonia; shake well, then set aside for half an hour, note bulk of the precipitate, and compare it with a standard volume or bulk obtained as an average from several specimens containing the above proportion.

The phosphoric acid is precipitated as ammonio-magnesium phosphate.

If a portion of the phosphates have separated from solution in alkaline specimens, they should be re-dissolved nitric acid, then made neutral by caustic soda, before proceeding as above.

UREA.

Estimated by the hypobromite method in a nitrometer.

Solutions.

Potassium bromide	.	.	.	.	.	125 grammes.
Bromine	.	.	.	.	.	125 "
Water sufficient to make	.	.	.	.	.	1000 c.c.
Caustic soda	.	.	.	.	.	250 grammes.
Water sufficient to make	.	.	.	.	.	1000 c.c.

Used by mixing equal volumes.

The accompanying table is calculated from the quantity of urea, taking 400 to 500 grains daily as a normal standard.

THE RELATION OF UREA TO SPECIFIC GRAVITY.

Specific gravity.	Per cent. urea.	Specific gravity.	Per cent. urea.
1.010	1.00	1.024	1.95
1.012	1.20	1.025	2.00
1.014	1.35	1.026	2.05
1.016	1.50	1.027	2.10
1.018	1.65	1.028	2.15
1.020	1.75	1.029	2.20
1.022	1.85	1.030	2.25
1.023	1.90		

Quantity of urine for twenty-four hours, 90 to 48 fluidounces, taking 400 to 500 grains as the normal daily quantity.

6 EAST FORTY-NINTH STREET, NEW YORK.

RECENT METHODS OF GASTROSTOMY FOR STRICTURE OF THE ŒSOPHAGUS.¹

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THE surgery of the gastro-intestinal tract has made wonderful progress within the last fifteen years. Especially has that of the stomach been rapidly developed; and this, I believe, for the reason that not only do diseases of the stomach proper require operations on the organ, but also strictures of the œsophagus, at least in the majority of cases. In patients who suffer from a slowly but surely increasing cicatricial or cancerous stricture of the œsophagus the surgeon is called upon to perform gastrostomy—to establish a gastric fistula.

In former years every doctor who had a case of stricture of the œsophagus under his care dreaded to give his patient the advice to have the stomach stitched to the abdominal wall and opened. He generally sent the poor sufferer to the surgeon at the last possible moment, when even fluids had refused to pass the œsophagus—when rectal alimentation had become necessary. And why did the physician do this? why did he temporize as long as possible? Why did the surgeon, too, hesitate to perform the operation? Because the doctor had generally seen his patient die quicker with than without the operation; because, in most cases, the food which had been poured into the stomach through the tube in the artificial opening oozed out or even flowed back along the

¹ Read before the Medical Society of the State of New York, at its Eighty-eighth Annual Meeting.

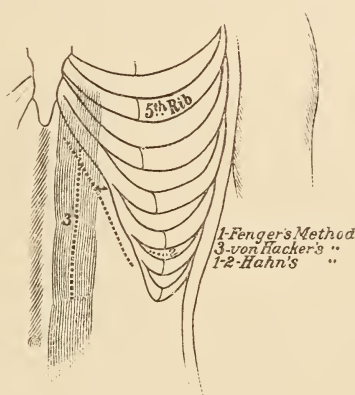
tube, so that not enough was retained to nourish the patient—the oozing, moreover, producing a troublesome painful eczema in the epigastric region; because, in one word, it had formerly been impossible to keep the walls of the fistula tightly adjusted to the tube.

This formerly well-founded reason for delay happily does not any longer hold good. It cannot be said too often and emphasized too much, for the sake of all the unfortunates afflicted with stenosis of the œsophagus, that there are at present “a number of methods” at the surgeon’s disposal which enable him to prevent regurgitation from a gastric fistula. Thus the patient will nowadays certainly not die from starvation.

These recent methods have put the indication for gastrostomy for stricture of the œsophagus on an entirely different basis.

Permit me to call your attention for a moment to the old method of performing gastrostomy, generally called the “method of Fenger.”¹

FIG. 1.



An incision three inches long is made parallel with the border of the left ribs from near the median line down to the eighth cartilage (1, Fig. 1). The abdominal wall, with the peritoneum, is divided in the same line. An area of the anterior wall of the stomach about one and one-half inches long and one inch wide is attached by sutures (about 15 to 20) to the cut surface of the abdominal parietes. Loose tamponade. Rectal alimentation. Three to five days later the dressing is removed and

¹ The operation was originally proposed by Chr. A. Egeberg, a Norwegian military surgeon, in 1837; published in 1841. Charles E. Sédillot, of Paris, later of Strasbourg, gave it its name and its indications in 1846, and performed the first gastrostomy on the human subject at the Strasbourg Clinic, November 13, 1849. The operation was later modified in its details by C. E. Fenger, of Copenhagen, in 1853. The first successful case is that of Sydney Jones, of London, in 1875. The first case on record in America for obstruction of the œsophagus was performed by F. F. Maury, of Philadelphia, June 25, 1869; the first case in New York by A. Jacobi in 1874.

the stomach incised with a knife, between two slings, which had been put in at the time of the operation in order to identify the exact position for the opening; the latter was made very small. Hagedorn proposed to use Paquelin's thermo-cautery for making the puncture. Only if the patient were very low was the gastric fistula established at once.

CASE I.—Man, aged forty-two years. Malignant stricture of the œsophagus near cardia. Only fluids pass. Marked emaciation. November 7, 1889, gastrostomy, first part, at the German Hospital; Fenger's incision. Two days later incision with Paquelin, just large enough to give entrance to a small-sized drainage-tube. Regular feeding. A few days later beginning leakage. Tube exchanged for larger size. Soon renewed regurgitation; mechanical devices fail to make the fistula water-tight; progressive eczema of surrounding skin in spite of proper treatment with pastes, etc. Increasing emaciation. Death from exhaustion and right croupous pneumonia, November 20th.

CASE II.—Man, aged sixty years. Cancerous stenosis of œsophagus near cardia. October 16, 1890, gastrostomy, first part, Fenger's incision. October 18th, stomach opened with Paquelin. Also in this case the same annoying consequences set in. Patient slowly lost ground, and died November 16th. Post-mortem showed a croupous pneumonia of the right upper lobe.

This primitive method of gastrostomy continued the only one in use for forty years. Owing to the generally experienced ill-success of this operation, as far as the functional result was concerned, methods of surgical interference for the sake of relieving the troubles of an œsophageal stenosis fell into great disrepute.¹ To-day Fenger's method, as originally proposed, is practically abandoned.²

¹ A multitude of mechanical devices intended to avoid leaking have been brought out from time to time. I shall mention a few only. Von Langenbeck made use of a small rubber air-pillow with a central opening. Through it the tube, which was closed by a stopcock, passed into the stomach. The pillow was covered and held down by a piece of lead perforated in the middle and held in place by a circular elastic band. Lannelongue applied an hour-glass-shaped obturator, which could be blown up with air, the stomach-tube passing through its centre. Kappeler's assistant, Huber, constructed the following apparatus (*Deutsche Zeitschr. f. Chirurgie*, vol. xvii. p. 132): A tube made of horn, with an outward curve at its lower end, is split lengthwise, so that the two halves can be separately introduced and, when in place, readjusted. A wide rubber ring covers the lower trumpet-like (intra-gastric) end. It holds the tube firmly in place and avoids pressure. The upper straight part of the divided tube carries a worm and a screw-nut on its outer side. Where it emerges from the abdominal parietes it is surrounded by a small rubber air-pillow, which is held down by a metal plate screwed down upon it. Over the upper end the feeding-tube is slipped and closed by a clamp. In one of Kappeler's cases this obturator firmly closed a wide gastric fistula. Lately a glass tube of special construction has been recommended from Mikuliez's clinic. (*Berl. klin. Wochenschr.*, 1893, No. 1.)

² Three years ago Terrier, of Paris, stated that he was able to avoid the egress of the contents of the stomach by making a very small incision and only introducing a tube for feeding purposes. At other times it is kept out. (*Revue de Chirurgie*, 1891, No. 4.) Lately T. Nicolaysen, of Christiania, similarly modified the old method. He lifts up a square-inch portion of the stomach wall to the parietes by 4 to 6 mattress sutures. They are tied over pieces of tubing after an area of the stomach of not larger than a bean's size has been stitched to the parietal peritoneum and muscles at the middle of the wound. The external wound is closed by deep and superficial sutures. Either at once or after twelve to twenty-four hours the stomach is incised. The hole is made small so as to let pass a Nélaton catheter of medium size. This is

It will be noticed that the great objection to Fenger's method was the liability to leakage from the fistula around the tube. Four methods have been recently devised to overcome this difficulty—the methods of Von Hacker, of Hahn, of Witzel, and of Ssabanejew-Frank.

1. *The method of Von Hacker.*¹ In this the operator makes the fistula through the left rectus muscle, so as to secure a sphincteric action from the tonic contraction of its fibres around the extruded portion of the stomach wall.

I shall describe the operation as I used to perform it. Longitudinal incision three inches long over the left rectus muscle, beginning about one inch below the border of the left ribs, and the same distance to the left of the median line (3, Fig. 1) Blunt dissection of the belly of the muscle—best with the handle of the knife.² Opening of peritoneal cavity. A fold of the anterior wall of the stomach as near to the fundus as possible is grasped with two fingers, pulled forward out of the wound, and at once secured with two slings of thin silk which embrace the serous and mucous coats of the organ. They are held by the assistants in the middle of the abdominal wound. These slings are left in the stomach, and will serve as a guide for the subsequent incision. Care is taken to let them pierce the stomach on a line parallel to its longitudinal axis. Then the incision between them will run parallel to the branches of the gastro-epiploic arteries, thus reducing hemorrhage. (This point was of some value if the stomach could not be lifted up well and the opening had to be established near the pylorus.) Now a silk-worm-gut suture is passed near the upper border of the peritoneal wound through the entire thickness of the abdominal wall, including the skin, catching the stomach on its way. It is not tied. Its ends are clamped by an artery forceps. The same is done below, the stomach wall having been well stretched by the left hand of the operator, to make sure that it will afterward easily adapt itself to the peritoneum without producing folds. Then a number of silk sutures are put in on both sides—about eight or ten in all. They pass the serous and muscular coats of the stomach and embrace the entire thickness of the abdominal

kept in for three days and then removed. It is temporarily reintroduced for feeding purposes. In two cases the functional result of the direct—not oblique—fistula was perfect. If desired it can be bluntly dilated. (Forhandl. i det Norske med. Selskab. Report in Centralbl. f. Chirurgie, 1894, N. 4, p. 83.)

¹ V. Hacker: "Ueber die Verwendung des Musculus rectus abdominis zum Verschluss der künstlichen Magenfistel," Wien. med. Wochenschr., 1886, Nr. 31 u. 32; und "Ueber die Erfolge der Gastrostomien mit Sphincterbildung aus dem Musculus rectus abdominis," Wiener. klin. Wochenschr., 1890, Nr. 36 u. 37. C. Strunz: "Ueber fünf weitere Fälle von Gastrostomie mit Sphincterbildung aus dem Musculus rectus abdominis, V. Hacker," Chirurgische Beiträge aus dem Erzherzogin-Sophien-Spital, Wien, 1892. Rep. in Centralbl. f. Chirurgie, 1893, No. 9, p. 208.

² Girard suggested that some of the fibres of the rectus muscle should be crossed, in order to have a still more pronounced sphincteric action. (Correspondenzblatt f. Schweizer Aerzte, November 11, 1888.) According to other surgeons' and my own experience this is an unnecessary addition.

wall, but emerge in the subcutaneous tissue. They do not penetrate the skin. (A hook-shaped needle will be found most convenient for the purpose.) These sutures are tied at once. Then the silkworm-gut sutures are tied and the angles of the wound closed by a stitch or two. The middle of the wound, about one inch long, is left open and loosely packed with gauze. Dressing of the closed portion of the wound with iodoform gauze and collodion. The patient may partake of liquid diet if he be able to swallow; if not, rectal alimentation is resorted to.

Two or three days later the stomach is opened. Within this time the wound has healed by primary union and granulation commenced in that part of it which had been packed. The stomach juice coming in contact with the wound now will not disturb healing. This is, no doubt, an important point; Von Hacker specially emphasizes it. The fistula to be made in the middle of the incision will be far more satisfactory if the rest of the wound be healed by primary union. For this reason operation in two stages is preferable, but in greatly reduced patients we should, of course, try to give immediate relief. The incision is always made with the knife, and as small as possible, just large enough to admit the smallest-sized drainage-tube. Cocainization of the stomach wall is unnecessary. The patient does not experience any pain. Generally two small arteries spurt. They are clamped and tied. (Paquelin cautery is never used for opening the stomach. With it an eschar is made, which when pushed off rapidly enlarges the hole.) A long tube is now inserted *à frottement*, and about six inches of its external extremity left projecting beyond the abdominal wall. It is closed by a stopcock. Then the surrounding wound is repacked. Now the two silk slings are removed. The tube is held in place by slipping over it down to the abdominal wall a short piece of the next larger size of tubing, armed with two safety-pins. A piece of gauze, partially incised, is pushed underneath the pins, another one with a small centre hole on top. Both are held in place by the rubber adhesive plaster straps, as used for laparotomy, or by a square piece of muslin with a small centre hole and one or two long pieces of tape on either side, which pass around the body and are tied by the patient in front.¹ Soon an ointment dressing is applied. Ten days after the operation the patient gets up.

Von Hacker's method is no doubt a very good one. If properly carried out, leakage very rarely sets in. If it does, the tube must be exchanged for one of larger size. If the largest in the market has been put in and yet some of the food regurgitates at times, the tube should be removed during sleep, the stomach meanwhile being kept empty; on

¹ Other authors keep a short tube in place by closing it with a clamp just in front of the abdominal wall, which is then held down by the dressing. I prefer the method described and the long tube. The introduction of food through the tube can be done farther from the wound without disturbing the dressing.

the following day it is replaced, and the fit will be perfect, as before. Von Hacker needed in his cases a special stomach canula with double rubber balloon (the Von Hacker-Scheimpflug canula).¹ All my patients have worn a simple rubber tube in the fistula. It fully occluded the opening. In none of these cases did eczema set in. According to my observations the small incised wound in the stomach first enlarges rather quickly; its borders are probably digested by the gastric juice. A tube three times as large as the first can be easily put in after about eight days. But soon—apparently with advancing cicatrization—the limit was reached. No larger sized tube is needed; the fistula becomes and remains patent. In one of my cases I saw the patient shortly before death—four months after the operation. He had a distressing, continuous cough, and expectorated, rather vomited, large masses of the ulcerating neoplasm. I satisfied myself that in the severest paroxysms of cough not a drop oozed out alongside the tube.

I have described the technique of this operation and its after-treatment at some length, because it gave me satisfactory results, carried out in the way described. It is a slight modification of that originally devised by Von Hacker, who opens the stomach by a somewhat larger incision, so that a tube of 6 to 8 mm. diameter can be put in. He cuts down to a needle, which is thrust through a fold of the stomach at the first stage of the operation, embracing the whole thickness of the two walls of the organ, mucous membrane included, and stitches the latter to the skin. I believe that the last-mentioned point, especially, is not preferable. It seems to me that the possibility of leaking is lessened if the stomach wall be left *in situ* after the incision, and not extruded.

Six patients with cancerous stricture of the œsophagus, all males, have been operated by me according to this method. One died in five days after the operation, in consequence of extreme weakness; two succumbed to a perforation of the growth into the trachea on the tenth and twelfth days respectively after the operation; one lived three, one four and a half, one eight and a half months after the operation. In every one of the cases the functional result was good.

CASE I.—G. W., aged seventy years and six months. Admitted to German Hospital, April 4, 1891. Increasing symptoms of stenosis of œsophagus for last ten months. Fluids still pass. Sounding reveals an impermeable stricture of the cardiac end of the œsophagus. April 6th, gastrostomy, first part. Operation as above described. Liquids by mouth allowed. April 8th, primary union of abdominal wound; stomach incised with knife; opening just admits the smallest size drainage-tube; fistula closes water-tight from the beginning. April 20th, largest size tube put in; no leaking. April 27th, discharged; weight 117 pounds. Patient was presented to the New York Surgical Society on

¹ Max Scheimpflug: "Ueber eine neue Balloncannule für künstliche Magen fisteln," Wiener klin. Wochenschrift, 1888, Nr. 24 u. 25.

May 13th (*N. Y. Med. Journal*, December 5, 1891, p. 637), and to the Section on General Surgery of the Academy on October 12, 1891 (*N. Y. Med. Record*, October 24, 1891, p. 517). Had then gained considerably in weight; able to do light work. November 11th, fistula closed tightly around tube; patient swallows at times bread with butter; weight 135 pounds. In the following weeks intermittent leakage. Whenever it occurred, stomach was kept empty toward evening and tube left out during the night. On the following morning its fit was again perfect. On December 15, 1891, pneumonia set in, to which patient succumbed in three days (Isabella Home), December 18th, eight and a half months after the operation.

CASE II.—N. N., aged forty-six; entered the country branch of the New York Skin and Cancer Hospital, February 9, 1892. Marked symptoms of stenosed Œsophagus. February 11th, gastrostomy, first part; feeding through the mouth on liquids, with rectal alimentation. February 14th, stomach opened and tube introduced; patient in good condition. He remained so for nine days, when suddenly symptoms of perforation of the growth into the trachea set in, to which the patient succumbed within twenty-four hours.

CASE III.—A. M., aged forty-seven; admitted to German Hospital, October 6, 1892. Difficulty in swallowing for the last eight months. Within the last few weeks had to be satisfied with fluid diet—even this often regurgitated; intermittent intense pain along sternum and dorsal spine; pulse weak and rapid; lost about fifty pounds; impassable stricture twelve and a half inches behind teeth. Rectal alimentation and subcutaneous stimulation preparatory to the operation. October 8th, gastrostomy, first part, working with A. C. E. mixture. Two days later stomach opened; external wound had healed by primary union; abdomen flat, painless; additional careful feeding through tube. October 12th, pulse not improved; patient very weak. October 13th, died under symptoms of heart failure.

CASE IV.—O. Sp., M.D., aged fifty-seven; increasing trouble in deglutition for nine months; lived on fluids for last six months—within last few days these cannot pass; at times lancinating pains through sternum and spinal column; extreme emaciation; aphony; laryngoscope reveals paralysis of left vocal cord; infiltrated hard glands in the left supra-clavicular region. Sounding omitted on account of previous repeated hæmatemesis. Admitted to German Hospital, January 7, 1893. Gastrostomy, first part; morphine-chloroform narcosis. January 9th, stomach incised; smallest size tube put in. January 12th, patient able to drink. Ten days later the largest size passed; no leaking; careful feeding; patient up and about. February 1st, discharged. Abdominal wall closed firmly around tube. Patient was presented before the Scientific Society of German Physicians, March 24, 1893 (*N. Y. Med. Monatsschrift*, 1893, No. 2, p. 450). General condition satisfactory. In the second half of April he began to cough; for more than a week he expectorated, without accompanying hemorrhage, large masses of the ulcerating neoplasm, thereby regaining the use of his voice and temporary ability of deglutition. Patient was regularly seen by me during this time. He had distressing paroxysms of cough, but at no time any loss of gastric juice alongside the tube. The sphincteric action of the rectus muscle was perfect. Patient died of marasmus May 20, 1893, four and a half months after the operation.

CASE V.—A. S., aged forty-three; admitted to German Hospital, January 5, 1893. For one-half year increasing symptoms of strictured œsophagus; lately liquid diet only; pain in region of cardia, where solid food is arrested; cachexia. January 9th and 13th, gastrostomy, in two stages. February 12th, patient in good condition; has gained in weight and strength; tube fits very well. March 8th, presented before the New York Surgical Society in good general condition (*Annals of Surgery*, May, 1893, p. 592). Could now and then swallow bread and chopped meat, at other times not even fluids. He had lately learned to chew his food and make it slippery with saliva and then blow it through the large tube into the stomach. He gave up this procedure later because of the consecutive very annoying pressure in the stomach caused by the amount of air that had been blown in with the food. To get rid of some of that pressure he had to lie down, raise the tube perpendicularly and remove its stopcock. Patient left the hospital March 11th. He died of increasing marasmus in the first days of April, three months after the operation.

CASE VI.—E. R., aged fifty-two; admitted to German Hospital, January 4, 1893. Since last October rapidly increasing hindrance in swallowing; sound meets a slight resistance seven inches, and a second impassable one twelve inches, behind teeth; a hard, movable, aching tumor of goose-egg size, especially painful on pressure, in the left fossa supra-clavicularis, reaching underneath the clavicle. Has lost considerably. January 11th, gastrostomy. January 14th, abdominal wound healed without reaction; stomach opened. January 21st, 6 A.M., sudden intense dyspnoea. Expired one hour later under symptoms of perforation of the growth into the trachea.

2. *The method of Hahn*.¹ Published in 1890; first performed in June, 1877.

Fenger's transverse incision; peritoneal cavity opened in same line; second cut in the eighth intercostal space (1, 2, Fig. 1). Parietal peritoneum is punctured at this point by forceps or knife and enlarged by spreading forceps. A fold of the stomach is drawn through the space with a dressing forceps and fastened by stitches between the two cartilages.

Hahn performed the operation eight times up to 1890, and was pleased with its results. He affirms that diaphragm and pleura will not be injured, and believes that the cartilages of the ribs act like a sphincter or stopcock. Von Hacker saw in two cases, Dalton (St. Louis) in one, erosion of the cartilage of the ninth rib follow the operation. It did not, as it seems, come into favor.²

3. *The method of Witzel*.³ Published in 1891. In this method the

¹ Eugen Hahn: "Eine neue Methode der Gastrostomie." *Centralbl. f. Chirurgie*, 1890, No. 11, p. 193.

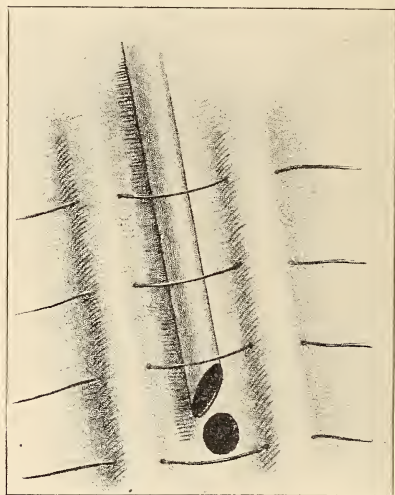
² This operation has lately been slightly modified by A. Coccherelli, of Parma. Incision in seventh intercostal space inward of axillary line only through skin. Later pulled downward. Division of eighth intercostal space; peritoneal cavity opened. Fold of stomach pulled forward and stitched to peritoneum below eighth rib. Stomach opened and sutured to skin-wound. This latter part of the operation is done, if possible, on fifth or sixth day after the operation.

³ Oscar Witzel: "Zur Technik der Magen fistel-anlegung," *Centralbl. f. Chirurgie*, 1891, No. 32, p. 601.

fistula passes through both the rectus and the transversalis muscles, whose fibres, running at right angles to each other, may be expected to contract still more efficiently than the rectus muscle alone. The second important feature of this operation of Witzel's is the infolding of the tube in the wall of the stomach, which is stitched over it so as to form an oblique canal.

Fenger's oblique incision through the skin and subcutaneous tissue. Longitudinal incision of the sheath of the rectus muscle. Blunt separation of the rectus and underneath of the adjacent transversalis parallel to the direction of their fibres. They are held apart by large blunt hooks. Division of the peritoneum obliquely. The stomach is drawn out in front of the wound, its margins being packed with sterilized gauze, and at once incised by a very small hole toward the cardiac extremity (Fig. 2). Into this opening a snugly-fitting rubber tube (of

FIG. 2.



about 25 to 28 French gauge) is introduced and then buried in the wound of the stomach (infolded) to the extent of about one and one-half inches by stitching over it two folds of the stomach wall (double row of Lembert sutures), as seen in the diagram (Fig. 3). These folds run from the left down to the right and upward, parallel to the external wound. Special care must be taken to put a few stitches beyond the entrance of the tube where a small groove is formed (see Fig. 4).¹ The entire area is then stitched to the edges of the peritoneal wound by interrupted sutures, thus rendering the operating field extra-peritoneal. Then the

¹ Instead of the twelve sutures marked in the diagram (Fig. 4), there should be about four to six.

large hooks, which hold the muscles apart, are removed. The latter return to their former position and hold the tube between themselves like a double (natural) clamp. The edges of the abdominal wound are sutured by silkworm-gut or silk up to its inner border where the external end of the tube emerges.

FIG. 3.

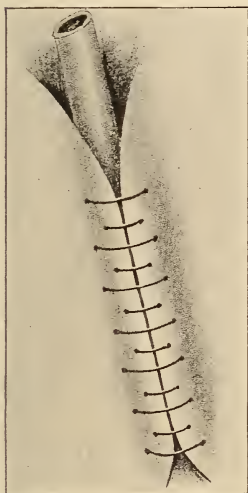
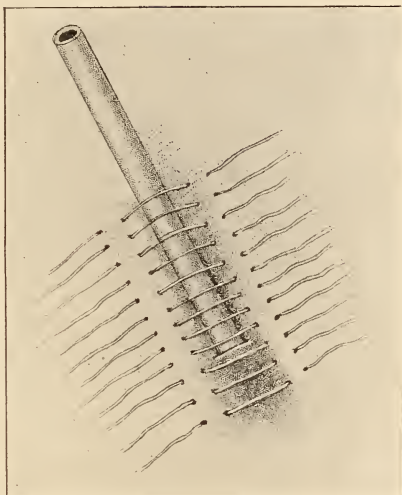


FIG. 4.



Witzel had thus operated on two patients for malignant stricture of the œsophagus with perfect success. The patients were fed through the tube immediately after the operation. At no time was there any leakage. He even removed the tube after nourishment had been poured into the stomach and reintroduced it temporarily when the next meal was due. The patient remained perfectly dry.

In January, 1893, Mikulicz had published by his first assistant, Von Noorden, five cases which had been successfully operated upon in this way: four for cancerous and one for cicatricial stenosis of the œsophagus.¹ In every one of the patients the tube fitted absolutely tight immediately after the fistula had been established.

In perusing the recent literature I see that the next cases of this kind published are my own, three in number.

CASE I.—A man, aged fifty-nine years, was admitted to the German Hospital, January 21, 1893. Difficulty in swallowing began about one year ago and had continued to increase; within the last days fluid

¹ Berliner klin. Wochenschrift, 1893, No. 1. In a postscript Mikulicz states that within the last two months the operation according to Witzel had been performed a few more times, always with the same satisfactory result.

refused to pass. There was great emaciation, and diffuse putrid bronchitis existed. A bougie was found to meet resistance near the cardia. January 23, 1893, gastrostomy was performed, strictly following Witzel's description.¹ The rectus and transversalis muscles were bluntly divided. A tube of 28 French gauge was used, and was buried in the wound for about one and three-quarters inches. The patient stood the operation very nicely. Some fluid poured in through the tube after the operation did not regurgitate. Later, feeding at regular short intervals. In spite of very frequent and hard coughing spells, there was not the slightest regurgitation at any time. A small strip of iodoform gauze had been put alongside the tube at the time of the operation, before the external wound was closed by stitches; this was removed on the third day. The wound had healed by primary union throughout.

According to Mikulicz's advice, the patient was kept flat on his back for a few days after the operation, in order to favor a proper working of the fistula. This, I believe, was a mistake. With my present experience I should have let such a patient sit up at once, to prevent pulmonary complications. On the third day after the operation the temperature suddenly rose and pneumonia developed. He died on January 26th, five days after the operation. Post-mortem showed bilateral pneumonia; no symptoms of peritonitis.

The specimen, which is of great interest, was presented to the New York Surgical Society, March 13th.² (See Fig. 7.)

CASE II.—A woman, aged thirty-five years; first experienced difficulty in swallowing seven months ago. Admitted to German Hospital, February 24, 1893. An elastic bougie meets obstruction near the cardia. She had lost flesh considerably within the last few months. Great weakness. Pulse, 120. Marked gastrectasia. Enteroptosis. Immediate operative interference indicated, as fluids also were regurgitated. Operation February 26, 1893. Muscles bluntly divided. Rectus small. Incision covers a portion of external and internal obliques, which were also separated in the same way. Stomach very large. Easily pulled in front of the wound. Tube infolded for about two inches. Operation took longer than anticipated on account of some difficulty encountered in lining the field of operation with peritoneum at the lower angle of the wound.³ Here a small strip of gauze was introduced into the peritoneal cavity for drainage, also alongside the tube. The latter was fastened with a silkworm-gut stitch to the skin, where it emerged. Rectal alimentation during the first twelve hours; then direct feeding through tube. No regurgitation. No tenderness over abdomen. No tympanites. Stimulation. Patient did not rally, however. She gradually sank, and died from heart-failure thirty-six hours after the operation.

CASE III.—A man, aged fifty-six years, entered the German Hospital

¹ I believe that this was the first case of this kind operated on in this country.

² *Annals of Surgery*, May, 1893, p. 595.

³ I believe that the difficulty was caused by infolding a longer portion of the tube than is necessary. One and a half inches will, it seems, be sufficient for producing a well-closing canal.

for stricture of the œsophagus, on March 16, 1893. He had acquired specific disease at the age of twenty-six. He first noticed difficulty in swallowing four years ago. One year later he came under the care of Dr. Max Einhorn, of this city. The latter had sounded him and found a stricture behind the bifurcation of the trachea. Under the use of iodides the patient improved greatly for a time, being soon again able to swallow all kinds of food. Every six to eight months the stenosis again manifested itself, but always yielded to anti-specific treatment. The latter consisted mainly of the iodides, as mercury always produced a marked and obstinate stomatitis. Three months ago he suddenly developed great difficulty in deglutition. Could not even drink fluids. Again a short turn for the better took place. Yet he followed advice and entered the hospital for an operation. Whilst there, he was suddenly attacked by a broncho-pneumonia, March 23d. There were râles all over the lungs, and marked bronchial breathing posteriorly over the right lower lobe; temperature ran up to 104° ; extreme weakness. Quite suddenly the passage down to the stomach was again blocked for semi-solid food; only small quantities of fluid passed. I had to resort to rectal alimentation and strong subcutaneous stimulation. Luckily the fever dropped at this time, and soon a small amount of fluids could be swallowed again. On April 13th I could dare to submit him to Witzel's method of gastrostomy. Rectus muscle (fairly developed) is bluntly divided. Anæsthesia badly borne; there is continuous retching and coughing; pulse weak and rapid. The lower end of the operating-table was raised and the operation done throughout in this posture. In order to save time the oblique and transversalis muscles were divided with the knife according to the old Fenger's incision. Stomach rapidly found and pulled out. A 28 French-gauge tube was easily introduced and infolded, and the operating field lined with peritoneum. As some stomach juice had oozed out of the small incision during one of the strong paroxysms of cough, just when its borders were held aside with small sharp hooks in order to let the tube pass, a small strip of iodoform gauze was introduced through the lower angle of the wound into the peritoneal cavity, for safety's sake, and passed out between two of the silkworm-gut sutures which closed the external wound. Another small tampon was put alongside the stomach-tube. It emerged out of the median angle with the latter, which was secured there to the skin by a loosely tied silkworm-gut suture. Dressing. Feeding through the tube after a few hours. Patient was at once kept in a sitting position in bed to avoid further complications of the lungs. Nevertheless, signs of pneumonia with rise of temperature developed on the next day in the same area which had been attacked before. Patient coughed almost continuously. No better opportunity could be desired for demonstrating the brilliant functional result of this operation. It can be asserted that not a drop escaped from the stomach alongside the tube at any time. The wound healed kindly by primary union. The two tampons were removed after forty-eight hours. The lung trouble slowly subsided. Patient made a good recovery. He was presented to the New York Surgical Society on May 10, 1893.¹ He had taken his supper two hours before. The tube was removed and the man made to cough as hard as he could. Not a bit of stomach contents was pushed out. The

¹ Annals of Surgery, November, 1893, p. 555.

skin around the fistula was, and is, up to date, in perfect condition. (See Figs. 5 and 6.) I noticed at that time, and do so still, a slight

FIG. 5.

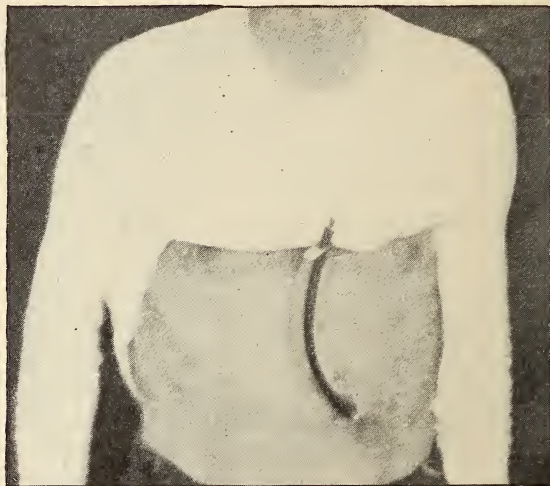
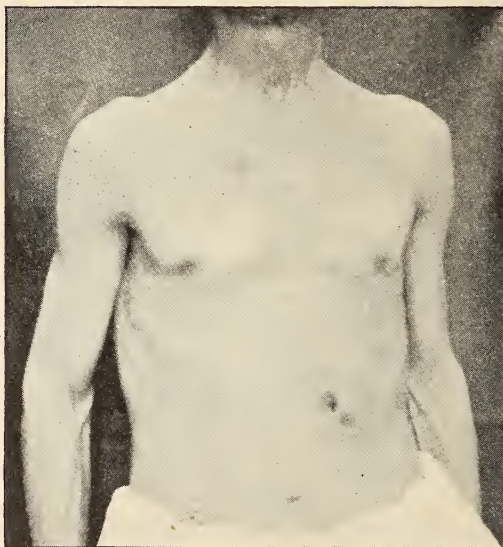


FIG. 6.



resistance when, on reintroduction, the tube enters the oblique canal which has been made through the stomach wall. This resistance is cer-

tainly due to contraction of the muscular part of the stomach wall. Patient was at the time of the presentation able to swallow bread and meat. This condition lasted for about four weeks, when within a few days the stenosis was found to be again impermeable. The passage became suddenly free twice since that time—on October 20th, and again on January 20th of this year. In October it occurred after a very severe paroxysm of cough, and lately after a hard sneeze. Each time semi-solid food could be well swallowed.¹ This enjoyable condition lasted about three weeks, when the old blockade reappeared. To-day the patient is in good general condition. He has gained flesh since the operation. He weighs now 126 pounds; before the operation, 113. I cannot yet endeavor to state the real cause of the stenosis. It seems to me impossible to pronounce it a syphilitic stenosis. Spasm and extra-œsophageal intermittent glandular swelling can, I believe, be excluded. It is also improbable on account of the long standing of the trouble, that a malignant growth has developed on the basis of specific scars or ulcerations. I am rather inclined to believe that the œsophagus is bent laterally behind the bifurcation of the trachea, held down to one side by extra-œsophageal contracted tissue. A diverticulum has probably formed at this spot. (The case resembles very much that reported by Maury in THE AMER. JOURN. OF THE MED. SCI., April, 1870, p. 365.)

As the patient is quite satisfied with his present condition, I have not yet interfered, in order to watch the further development in the function of the fistula, which so far is admirable. I hope to be soon able to report something more definite about the exact pathological condition and probably also of the curative factor in this interesting stenosis.²

Lately, W. W. Keen, of Philadelphia, has published a case³ where he performed Witzel's method of gastrostomy in a man aged forty-eight years, for a primary cancer of the œsophagus. He was able to fully corroborate what had been observed by Witzel, Mikulicz, and myself. He also found the operation "effectual in preventing any leakage."⁴

Most probably other surgeons have meanwhile resorted to this method

¹ A sound passed into the œsophagus at the time was stopped at the same spot as formerly, 10 to 10½ inches behind the teeth. The attempt at letting the patient swallow a perforated shot on a silk thread was also frustrated. If the manœuvre had succeeded, it had been my intention to localize the shot with the cystoscope, or in the empty stomach with the help of a urethral tube and head-mirror, catch it with a forceps, pull it out of the fistula and then use the thread for retrograde dilatation by tying tubes to its end.

² On February 20th I washed out the stomach and filled it with ten ounces of water, removed the tube, introduced the cystoscope, and searched for the cardia. I found it and introduced an elastic bougie into the œsophagus under the guidance of my eyes. About three to four inches up it was held by an impassable resistance.

Meanwhile the patient died of broncho-pneumonia at the German Hospital, April 30, one year and seventeen days after the operation. *Post-mortem*: Cancer of the œsophagus behind bifurcation of trachea; communication of œsophagus with right bronchus; inner aspect of gastric fistula corresponds to the picture as shown in Fig. 7, cone, however, less projecting; there are a number of radial folds of the mucous membrane around the inner opening.

³ "Gastrostomy by Witzel's Method for Primary Cancer of the Œsophagus." *Annals of Surgery*, December, 1893, p. 638.

⁴ Another successful case in a man of seventy-two has lately been reported by Dudley Tait. Paper read before the California Academy of Medicine, May, 1894. *Pacific Med. Journ.*, June, 1894.

in proper cases. They have not, however, as far as I could find, published their experience.

Witzel's method is an excellent one. It is, beyond doubt, the best known. It is "simple, moderately rapid," and prevents leakage and its distressing sequelæ with "absolute certainty," even when the tube is

FIG. 7.



removed. By infolding the tube, the entrance of the latter into the stomach is rendered oblique. Thus an organic valve is artificially formed. This explanation of Witzel is fully justified by the specimen obtained from my first patient. The condition is identically the same as found at the post-mortem of one of Mikulicz's cases. As seen in Fig. 7, which is drawn from the specimen, a short artificial cone obliquely protrudes into the lumen of the stomach. It is formed by the stomach wall itself, and is produced by the peculiar and ingenious mode of stitching the same over the tube. At its tip the tube emerges. It is evident that even when the rubber tube is removed, the intra-gastric pressure must close this internal entrance to the fistula by pressing its two walls upon each other. Mikulicz observed that in the course of time the outer and inner openings approached each other, so that the tube later enters the stomach rather in a straight sagittal direction, not, as at first, obliquely. Still, it worked to perfection. I did not experience this change of direction in my third patient, who has worn his tube now for almost ten months. It still passes the abdominal parietes obliquely, yet not quite so much as at first. This, however, is due to a superficial ulceration in the line of incision near the median angle which occurred about three months after the operation. Slowly the scar, which at this

place involved skin and subcutaneous tissue only, gave way. At present the tube leaves the scar at about the junction of its middle and inner thirds (see Fig. 6). The angle formed by the tube with the anterior abdominal wall is still 45° .

It is worth recording that Witzel suggested, in his first article, the same operative procedure for establishing a suprapubic vesical fistula. Zweifel, of Leipzig, was the first to carry out this idea, May 2, 1893, in a woman of thirty-eight years who had carcinoma of the urethra. (*Centralbl. f. Chir.*, 1893, No. 37, p. 785). He extirpated the entire infiltrated canal, with a portion of the bladder, closed the latter by suture, and made a suprapubic artificial urethra, using, after laparotomy, the posterior wall of the bladder where it is covered by peritoneum. The result was ideal. Martin, of Cologne, successfully did the same operation on the extra-peritoneal suprapubic part of the bladder for pronounced hypertrophy of the prostate with retention, in a man of sixty-seven years (*Centralbl. f. Chir.*, 1893, No. 47, p. 1026). The functional result was all that could be desired. Wiesinger, of Hamburg, had a similar success in a woman of seventy years, on whom he had to operate for cancer of the urethra and the fundus of the bladder; also in a number of patients who suffered from hypertrophy of the prostate. (*Centralbl. f. Chir.*, 1894, No. 22.) I personally tried the method on a patient of seventy-three years, with retention (due to hypertrophy of the prostate) and a large encysted stone, at the German Hospital (January 30, 1894). Suprapubic cystotomy was done, the stone removed, and the bladder closed by a double row of sutures down to lower angle of the vesical opening, where a soft rubber catheter was introduced. The latter was then infolded for about one and one-half inches, after Witzel's method; permanent drainage. Splendid functional result for the first two days; then, during a passage from the bowels, the lower end of catheter pushed out of the bladder. It had been purposely fastened to the outer skin only. Reintroduced; no leakage. Two days later the same accident; again replaced. This repeated manipulation spoiled the result. Patient now cured, with tightly closing wound around catheter. On August 20th I made use of the method in a man of sixty-five years of age with retention due to hypertrophy of the prostate. So far the result is extremely satisfactory. In a recent article, Witzel states that he had used his method of making an oblique fistulous canal with very good success in a lady for an enormous hydronephrosis. He advises the making use of it also in cases where the gall-bladder needs permanent drainage, and where a temporary artificial outlet must be given to the contents of the small intestine (*Centralbl. f. Chir.*, 1893, No. 47, p. 1025).

A few points referring to this method of operating, as observed in the case of the last patient with the lapse of time, may be mentioned here.

If the stomach be very much distended, one and one-half pints to one quart having been poured in and the tube then removed, about one-half to one ounce first runs off, mixed with some bubbles of air. Then, suddenly, the outpour ceases. Even strong cough does not throw out a drop. This phenomenon is easily explained. In the very distended stomach the internal cone runs more in a sagittal line. If the tube be extracted, a sufficient amount must first be expelled before the canal again takes its oblique direction, thus producing the valve. But as soon as this is the case, the intragastric pressure at once shows its effect. If the tube be left in place, the fistula is always patent, no matter how much fluid is poured into the organ.

Another feature which is very marked in my case is the rapid contraction of the canal after the removal of the tube. It has happened quite often that the man coughed the tube out over night in one of his frequent severe cough-paroxysms, and, timid as he is, did not dare to at once replace it. When he then came to my office the next morning, the walls of the fistula had perfectly approached each other. (A urethral steel sound of the size of the tube pushed into the stomach always sufficed to make room for the tube.) For this reason I did not allow the patient to remove the tube temporarily and reintroduce it for each feeding, as Witzel did in one of his patients. Keen also "had tried to remove the tube temporarily in his patient, but had to abandon it from the difficulty of its reintroduction." Perhaps this rapid contraction is, in my case, due to the cicatricial tissue which had formed around the tube on its way through the abdominal parietes. As stated above, the muscles had been divided with the knife, and, of course, retracted at the time of the operation. However, the active contraction of the bluntly divided muscles of the abdomen will no doubt generally produce the same effect. I therefore believe we will do well in warning our patients not to leave the tube out for any length of time. They will then certainly not be in need of medical help.

I further mention as an interesting phenomenon that as long as the man was obliged to feed himself through the tube only, he had a ravenous appetite, but when he could swallow by the mouth the appetite was at once markedly diminished. When the Œsophagus is obstructed, the patient brings up large masses of saliva and mucus about every half-hour. Sometimes the irritation of its presence above the stricture is not sufficient to produce a retrograde reflex spasm of the Œsophageal muscles. Then the patient complains of a heavy, annoying pressure in the region of the bifurcation of the trachea. He tickles his throat with a feather until he throws up these masses, then generally mixed with some of the material that had been poured into the stomach. It seems to me most plausible that "the want of satisfaction of the sense of taste," which Keen also mentions, is the cause of the often observed constant hunger in patients with an impermeable stricture of the Œsophagus, also after the gastric fistula has been established. For this reason we should induce patients of this kind to chew the solid food, and then either spit it out and have it washed into the stomach through a funnel, or blow it directly in through the tube themselves. This latter procedure I had done in one of my cases operated upon according to Von Hacker's method. As mentioned above, the patient did not like it, however, on account of the heavy pressure which was caused by the air blown in with the food.

I might here briefly discuss two points of the operative procedure. The blunt division of the rectus and transversalis muscles corresponding

to the direction of their fibres. Is this a point of vital importance? Can it always be carried out? In my first case the man, a laborer, had not a particle of fat left, but a splendidly developed muscular system. Almost the entire length of the oblique incision struck the left rectus muscle. It was divided with the scalpel-handle in its middle, and the two parts then drawn aside with two large blunt hooks. Then the transversalis was divided, following the direction of its fibres. The operation could be easily finished. However, the assistants assured me that it required all their force to hold the hooks sufficiently apart. In my second case the rectus was very small. The incision also traversed the oblique. I divided all four muscles bluntly, and had them held apart. I found great difficulty in stitching the stomach to the lower (outer) corner of the peritoneal wound. In carrying out this point to the letter, I certainly wasted some valuable time, which, considering the reduced condition of the patient, was not immaterial. In my third case I began the operation also with the intention not to cut the muscles. However, I noticed soon that I would have to divide the rectus muscle almost three-quarters down to the umbilicus, in order to gain the necessary space. I therefore divided the rectus muscle bluntly and then cut the other muscles with the knife, leaving the two parts of the rectus muscle out of the grasp of the hooks. When the intra-abdominal work had been completed, the external portion of the rectus fibres was lifted, and the tube passed underneath. I believe that this was unnecessary. The patient has now been under observation for ten months. His fistula is absolutely patent. I should therefore say that the final result of this operation will not be impaired, as far as its functional result is concerned, if the oblique and transversalis muscles be divided with the knife in the line of the incision. Of course, if blunt division be feasible, it should always be carried out. (It will be easier if we make the incision through the skin obliquely, and straight instead of curved parallel to the border of the ribs.) Thus, as Witzel emphasizes, will be avoided the formation, arising from the retraction of transversely divided muscles, of a dead space between the fixed portion of the stomach and the skin, which slowly has to fill up with cicatricial tissue. I also believe that the tube is more firmly held in place, and does not so easily glide out of its position in consequence of a coughing or sneezing spell, if compressed by the tonic contraction of muscular fibres that cross each other at right angles.

Is it necessary to line the field of operation on the stomach with parietal peritoneum? This certainly will guard against peritonitis by placing the same extra-peritoneal, and should therefore be done. How? If we make use of the interrupted suture—as Witzel seems to have done, and as I did in all my three cases—this part of the operation is time-robbing. In future cases I should first secure both angles of the peri-

toneal wound with a silkworm-gut suture, piercing the entire abdominal wall and catching the wall of the stomach outside of its operating field. These sutures are then held on the stretch without being tied, and a continuous suture is rapidly run from one end to the other on both sides. Perhaps even that is superfluous. Keen (*loc. cit.*) put three stitches through the stomach and then lifted it up by pushing the needle through the entire thickness of the abdominal parietes.

4. Ssabanejew-Frank method (previously called Frank's method). In this operation a cone of the stomach is drawn up out of Fenger's incision under a bridge of skin to a point above the border of the ribs, where it is fixed and opened.

I append the names of the two authors to this operation, because it appears, on perusing the literature, that J. F. Ssabanejew, of Odessa, devised and performed the identical operation¹ as early as May, 1890, and it was first done by R. Frank, first assistant of Albert, in Vienna, on November 23, 1892. The latter's patient was presented to the Imperial Society of Physicians of Vienna, December 9, 1892.² There is no doubt that Frank conceived the plan for the operation, being unaware of Ssabanejew's former similar procedure.

The operation is as follows: Fenger's oblique incision, pretty close to and parallel with the costal cartilages. The muscles should be bluntly separated according to the direction of their fibres. After dividing the peritoneum the stomach is drawn forward and a cone, of about one to one and one-half inches high, of the anterior wall of the stomach from near the fundus, held outside and in front of the wound with the help of one or two silk slings. The edges of the incised peritoneum are now stitched to the stomach around the base of this cone. Thus the peritoneal sac is at once closed. (Fig. 8.) Frank advises to also stitch the divided muscles to the stomach in order to strengthen and remove tension from the first row of sutures. A second incision is now made above the border of the ribs, three-quarters to one inch long and about one and one-quarter to one and one-half inches apart from the first one. It only penetrates the skin. The interposed bridge of skin is bluntly undermined, and the stomach cone pulled underneath it and out of the upper wound with the help of the silk slings. (Fig. 9.) The wound of the abdominal wall is closed and the stomach incised with the knife for about one-half inch (very handily done between the two slings), and stitched to the skin. (Fig. 10.)

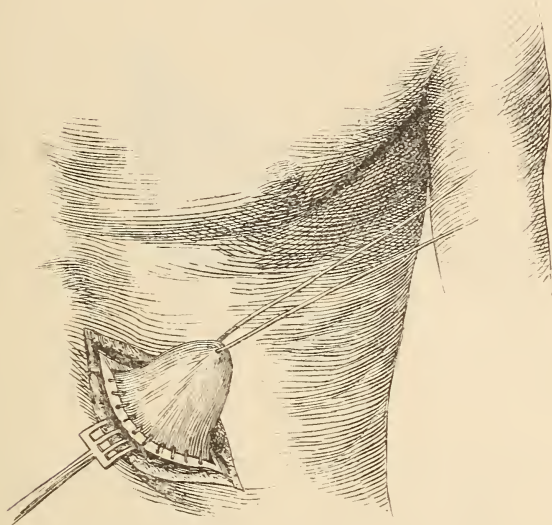
Ssabanejew has done the operation four times for cancer of the

¹ J. F. Ssabanejew, Odessa: "Ueber die Anlegung einer röhrenförmigen Magenfistel bei Verengerungen der Speiseröhre," *Vratch*, 1890, No. 39; and *Chirurgitscheski-Vestnik*, June, 1893, published in the Russian language. Cf. Report in *Centralblatt für Chirurgie*, 1893, No. 40, p. 862.

² Rudolf Frank: "Eine neue Methode der Gastrostomie bei Carcinoma cesophagi," *Wiener klinische Wochenschrift*, 1893, No. 13.

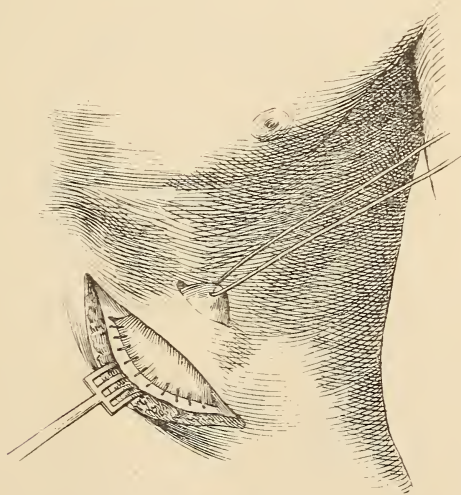
œsophagus. The patients lived from four days to ten months afterward. Their general condition greatly improved for some time. Regurgitation

FIG. 8.



through the fistula could be easily prevented. In two cases the autopsy showed the gastric fold firmly healed in its new position. Its nutrition

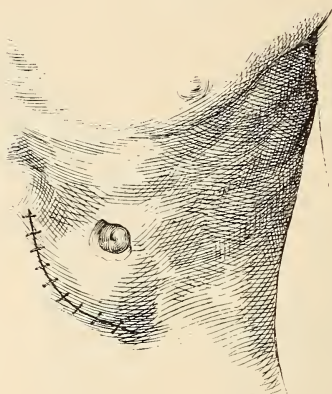
FIG. 9.



was not impaired by the curving and tension. The fistula was two to three inches long.

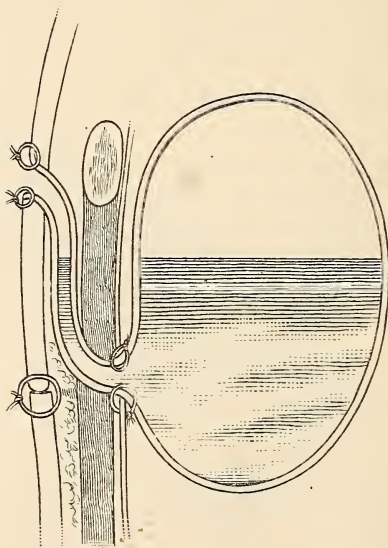
Frank reports four cases. Every one was successful also as far as the working of the fistula was concerned. He explains the favorable mechanical effect of this operation as follows: "As in Hahn's opera-

FIG. 10.



tion, the external opening of the fistula is raised; only if the stomach be filled to a great extent does the level of its contents reach the line which corresponds to the external opening (see Fig. 11). The incised

FIG. 11.



gastric cone is bent over the border of the ribs; the bridge of skin covering the cone compresses it. In all of Frank's cases the fistula

closed absolutely water-tight at all times without the use of a special apparatus. Only for the purpose of feeding was a catheter or drainage-tube introduced. Immediately afterward the patients could freely move around without losing anything of the stomach contents. No complaints were made on account of the drawn-out wall of the stomach. Frank adds that the principle brought out in the operation, namely, to let the fistulous canal pass the abdominal parietes in a curved direction underneath a stretched cutaneous bridge, might also be useful in cases of colostomy for cancerous rectal stenosis.

My own experience has been derived from the following three cases:

CASE I.—A man, aged sixty-seven years, lately treated for cancer of the pylorus, had brought up everything, fluids included, within the last eight days; intense emaciation. Admitted to the German Hospital, April 17, 1893. Stenosis near cardia; impassable. Operation, April 20, 1893. On account of the deep concavity of the abdomen the cone could not be pulled farther, in the strongly built man, underneath the skin-bridge than about one-half inch over the border of the ribs. There it was opened and incised; a tube was introduced. Immediate feeding. No regurgitation. Patient died of heart-failure the following day. I believe that here general narcosis had been contra-indicated; I should have used cocaine anæsthesia.

CASE II.—A man, aged sixty-one years, had symptoms of malignant stricture of œsophagus since last spring. On entering the German Hospital, April 17, 1893, he was very low, emaciated, and anæmic. Not a drop of water passed down. Rectal alimentation and stimulation—the latter also subcutaneously—preparatory to the operation, which was done April 24, 1893. Stomach greatly contracted; it could not well be drawn forward. Nevertheless the operation was finished without special difficulty. Skin bridge a little more than one inch wide. Second incision about three-quarters of an inch above border of the ribs. Patient stood the operation well. Lower wound healed by primary union. As a consequence of the undue traction exerted upon the attachment of the skin, a part of the lower circumference of the opening in the stomach somewhat retracted, and the upper wound, which had originally been made at least three-quarters of an inch above the border of the ribs, was pulled down below this border. Yet the result was good. I believe that undue tension can be avoided by putting a stitch of silkworm-gut through the entire thickness of the abdominal wall at both angles of the peritoneal wound, catching on its way a portion of the stomach. They are not tied until the stomach has been stitched to the peritoneum all around. They will hold the stomach thoroughly up to the abdominal wall, preventing traction on other sutures. Patient made a good recovery. He was presented to the New York Surgical Society on May 10, 1893.¹ He did not wear a tube except at the time of feeding. A large tube of almost a thumb's size is then always easily introduced. When presented, the patient had a full stomach; more water was added, and the man was then ordered to cough hard. Not a drop escaped. The functional result was certainly all that

¹ *Annals of Surgery*, November, 1893, p. 55.

could be desired. Patient died on June 14th, in consequence of cancerous cachexia.

CASE III.—H. S., a boy, aged four years, with impassable cicatricial stenosis of the œsophagus. Gastrostomy according to Von Hacker had been performed by Dr. Gerster for the sake of retrograde sounding and cutting with the string (Abbe), July 20, 1893. Feeding through the fistula. Considerable leakage from the stomach. Three days later the gastric opening was closed. The external abdominal wound healed by granulation. For a time the boy was better, when, about September 1st, a sound again refused to pass the stricture. He lost ground steadily. Patient then came under my care. Ssabanejew-Frank operation October 3, 1893. Stomach found fixed to the parietal peritoneum by very dense adhesions. It was freed for an area of about three inches, then its anterior wall pulled forward, the cone passed under a skin-bridge of about one and a quarter inches in width, and opened. There was great tension. In order to stitch the stomach to the lower circumference of the upper wound, a short longitudinal cut had to be added, thus making a T-shaped incision. Boy stood the operation nicely; but there was almost continuous leakage in spite of all trials to prevent it. On account of the complications presented in the case, this unsatisfactory functional result cannot well be brought forward against the value of the operation.

In reviewing the three operations advisable for gastrostomy—those namely, of Von Hacker, Witzel, and Ssabanejew-Frank—with reference to the usefulness and indication of each, we must pay attention to the character of the stenosis.

1. *Cicatricial*. Here the gastric fistula must be temporarily established if regular sounding from the mouth or from an artificial œsophageal lip-fistula in the neck¹ does not succeed, or succeeds only up to a certain degree of dilatation. This is especially experienced in treating long tubular strictures of the thoracic portion of the œsophagus. In such cases the surgeon performs gastrostomy—

a. For retrograde blunt dilatation, which, if successful, is later substituted by sounding from above.

b. For the purpose of enabling him to strive for a radical cure, viz., to divide the stricture (internal œsophagotomy) and then stretch it with sounds.

The stricture can be cut with small knives on a string, pulled through from below (Lange), or with a straight urethrotome introduced from an œsophageal fistula in the neck, after careful disinfection of the stomach and of the portion of the œsophagus below the fistula in the neck (Willy Meyer, *loc. cit.*), or with a string (Abbe).²

¹ Graser: "Zur Behandlung der Œsophagus-Stenosen," Verhandlungen der Deutschen Gesellschaft f. Chirurgie XIX. Congress, 1890, p. 136. Willy Meyer: "External Œsophagotomy in the Operative Treatment of Cicatricial Stricture of the Œsophagus; with a Proposition for Improving the Method of Performing Internal Œsophagotomy," N. Y. Med. Journ., 1892, p. 561.

² "A New and Safe Method of Cutting Œsophageal Strictures," N. Y. Med. Record, February, 1893, p. 225.

Internal œsophagotomy (cutting with a knife) is considered a dangerous operation up to the present date. This mainly on account of the surgeon's inability to properly disinfect the operating field; next on account of the danger of perforating the canal, injuring an adjacent vessel or nerve, etc., and setting up acute posterior mediastinitis. The first danger can be averted by carrying out the proposition made by me in 1892 (*loc. cit.*), viz., to add gastrostomy to external œsophagotomy. The safest radical method seems to be Abbe's operation—to relieve the œsophageal stricture by cutting with a string. It has to be proved yet, however, by a series of cases, that this method also properly and safely divides, with the hope of a permanent cure, a long tubular stricture of the thoracic portion. No doubt the two cases presented by Dr. Abbe to the New York Surgical Society¹ will induce surgeons to try his procedure before all others in cases that need an operation.²

But is there any way of avoiding the development of a marked cicatricial stenosis of the œsophagus, with its terrible suffering and sometimes incurable consequences for the patient?

In 1887 Maydl,³ of Vienna, proposed to perform in such cases gastrostomy as early as possible—very soon after the acid or caustic lye, etc., has been swallowed. In this way the food would not pass over the intra-œsophageal ulcerations—the continuous chemical and mechanical irritation would be avoided. Fluids might be swallowed; they would help to wash off the surface. Of course, cicatricial tissue would nevertheless be formed; there would also be the same tendency to its re-contraction; a stricture would form if matters were left to themselves. But by proper and “timely” sounding from below and above most probably can be avoided the narrow, twisted, often impermeable stricture which confronts the surgeon in almost every instance if no operation be performed.⁴ In view of the brilliant functional results obtained by Witzel's method, Mikulicz has again taken up this idea. He believes that “It will be wisest in severe cases of burn of the œsophagus to establish a gastric fistula *early*, to protect the reparative process inside the canal against the disturbances caused by the passage of the food.” In his one case mentioned above, where the elastic bougie did not pass any longer (for five days), swallowing became easier without help four weeks after the operation. Now a bougie cure, from above, was feasible and was suc-

¹ Report of New York Surgical Society. *Annals of Surgery*, July, 1893, p. 37, and January, 1894, p. 88.

² See also, W. T. Mayo: “Stricture of the Œsophagus; Division and Dilatation after Gastrostomy and Œsophagotomy; Testimony as to the Value of Abbe's String Method of Division,” *N. Y. Med. Journ.*, April 7, 1894, p. 433.

³ “Die Magen-Chirurgie der letzten fünf Jahre,” *Internat. klin. Rundschau*, 1887.

⁴ Von Hacker proposes to start sounding of the œsophagus with the help of this gastric fistula, two or three weeks after the accident. *Ueber die nach Verätzungen entstehenden Speiseröhren-Verengerungen*. Wien, 1889, p. 121.

cessful. One month later semi-solid food passed with ease. The tube was removed from the stomach. The fistula closed spontaneously without further interference within sixteen days.

Which of the three operations shall be performed in such a case? Frank states that his operation is devised for carcinomatous strictures only. It would require a troublesome operation to close the resulting fistula. Von Hacker's and Witzel's methods thus only come up for discussion.

With reference to the absolute patency of the fistula resulting from Witzel's procedure, we shall not fail by always giving it the preference, provided it can be carried out. Contra-indications are, according to Von Noorden:¹ 1. Great weakness of the patient, which would forbid an operation of nearly half an hour's time. This objection would not hold good any longer if we accept "early gastrostomy" in severe burns of the Œsophagus. 2. If, on account of cicatricial tissue in the gastric wall, the two folds of the latter cannot be properly raised. This objection also falls to the ground if gastrostomy be done shortly after the accident. 3. If the stomach wall does not yield to traction. Witzel asserts that "even the very much contracted stomach" can be pulled forward in front of the abdominal wound by a steady pull continued for a short while. I can corroborate this by my own experience. The future must decide as to this point. 4. The small size of the stomach in young children.

In cases of this kind, then, we would resort to Von Hacker's method. If the points in question cannot be decided before, but are found during the operation, we will close the oblique peritoneal wound and add at once Von Hacker's incision. In children the rectus muscle is rather poorly developed. Its sphincter-like contraction will rarely prevent leakage. Then we would be in need of the Von Hacker-Scheimpflug canula or Mikulicz's glass tampon (*loc. cit.*). Another drawback of Von Hacker's operation which has to be taken into account is that it will rarely close spontaneously after removal of the tube.

This spontaneous healing of the gastric fistula, as observed by Mikulicz, is certainly one of the most brilliant points in favor of Witzel's operation in this class of cases.

2. *Malignant stenosis.* Further experience is needed with reference to the merits and possible drawbacks in the final result of the Ssabanejew-Frank method before an attempt can be ventured at giving to each of the three operations its proper place. Yet the following may with propriety be said now. If further observation corroborates the experience made by Ssabanejew, Frank, and myself, namely, that after this method in every case perfect patency of the fistula also results, as after Witzel's,

¹ *Loc. cit.*

I do not doubt that it will become the standard operation for gastrostomy in cases of malignant œsophageal stenosis, and for these reasons: The operation can be more rapidly done than Witzel's; it is also safer, because the stomach is not incised primarily, but after the peritoneal cavity is closed; the stomach is, as in Witzel's operation, opened at once in the same sitting; a wide fistula results, which easily admits the largest-sized tube or nozzle of a syringe; the tube can be left out with safety; contraction cannot occur; thus the patient will be very comfortable and can himself easily introduce the tube whenever a meal is due.¹

If further experience should be adverse, however, which seems rather improbable, we again must elect between Von Hacker's and Witzel's operations only. About the same would hold good here that has been said above with reference to the cicatricial stenosis. If the patient be not too low, if the stomach wall can be drawn up and folded, Witzel's method will deserve preference in every case. But a large-sized tube should be selected for being infolded. Von Hacker's method will thus be reserved for those patients who are very low (cocaine anaesthesia).

It is to be hoped that, in view of these excellent operations, cases of malignant stenosis of the œsophagus will be nowadays referred to the surgeon in the early and not any longer in the last stage of the disease. "As soon as fluids and semi-solid food find some resistance in passing down, or as soon as the patient is visibly losing ground," says Mikulicz, "gastrostomy is indicated." I should make an addition to this dictum, and say, "and as soon as the scales show a steady, though perhaps slow decrease in the patient's weight." For this reason such patients should be ordered to weigh themselves every week or fourteen days and report to the physician. "It is absolutely wrong to let gastrostomy be the very last resort. By such temporizing, a condition of inanition will be produced in the patient which would contra-indicate an interference that otherwise has very little risk, if any. The surgeon cannot dare to do anything with the patient in a far-advanced state of inanition. The physician should be cognizant of the fact that a certain degree of strength and resistance is needed to stand even a relatively small operation; that a certain degree of active work of the tissues of the organs and of the whole organism is required to heal even a small wound; and that, lastly, the faculty of digestion and assimilation in the gastro-intestinal tract ceases in a certain stage of inanition, and cannot be awakened, even when a gastric fistula has been established. The patients starve to death with a full stomach, with full intestines." (Von Noorden.)

¹ It may occur that the stomach wall will not yield enough to be drawn out in a cone; perhaps then, if the carcinoma involves the lower portion of the œsophagus and the cardia or a part of the gastric wall—if this be the case, Witzel's operation should be resorted to.

An early operation, on the other hand, will be less dangerous; it can be done under general anæsthesia; it will by its result, "the rapid improvement of the patient's general condition," enable the doctor to more easily conceal from the patient the real nature of his trouble;¹ it will spare the patient the continuously increasing difficulty in swallowing; it will prevent dangerous and useless attempts at dilatation; and it will prolong life on account of the slower growth of the tumor due to the elimination of the mechanical and chemical irritation produced by the passage of food. This point deserves to be especially emphasized; with reference to it, gastrostomy for carcinoma Œsophagi must be put in parallel with colostomy for carcinoma recti. The latter gives less trouble, grows slower, and breaks down less rapidly, if excluded from the intestinal tract; the same holds good for carcinoma Œsophagi.

Summing up, I would say:

1. There are now three useful and reliable methods of gastrostomy at the surgeon's disposal. Of these, one (Witzel's) prevents leakage with absolute certainty. The two others, if properly carried out, promise the same good result. Thus the patient who had been submitted to this operation will not starve from regurgitation of the food alongside the tube.

2. In view of this fact, gastrostomy should be resorted to "early" in cases that will sooner or later need this operation.

3. In cases of burn of the Œsophagus, primary gastrostomy and timely dilatation of the contracting scar will most probably prevent conditions which at present generally confront the surgeon in this class of cases, and are sometimes incurable. Witzel's method of gastrostomy deserves preference. The oblique canal produced by it will close spontaneously when the tube has been removed. Thus a secondary operation will not be needed.

4. In cases of cancer of the Œsophagus a gastric fistula should be established as soon as the scales show a steady decrease of the patient's weight.

5. Further experience is needed with reference to Ssabanejew-Frank's method before an attempt can be made at giving each of the three operations its proper place in the treatment of cancerous stenosis. If future observations be favorable, Ssabanejew-Frank's operation seems to be destined to become the standard one for malignant stricture of the Œsophagus. If unfavorable, Witzel's method should be done wherever it can be carried out.

6. Von Hacker's method should then be reserved for far-gone cases, and should, if the patient be very weak, be done under cocaine-anæsthesia, best at two sittings. If properly performed the outlook for making the fistula close tightly around the tube is good.

¹ And this so much oftener, as it has been frequently observed, also—as in almost every one of my cases—that patients with cancerous tight stricture of the Œsophagus can swallow again, for a time at least, shortly after they have been fed through the gastric fistula only.

BACTERIOLOGICAL INVESTIGATIONS OF DIPHTHERIA IN
THE UNITED STATES.

A REPORT IN BEHALF OF THE AMERICAN COMMITTEE ON DIPHTHERIA¹
TO THE EIGHTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMO-
GRAPHY, HELD IN BUDAPEST, SEPTEMBER 1 TO 9, 1894.

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It is intended in this report to present the more important results of the bacteriological study of diphtheria by American investigators, so far as these results are believed to be of interest for the purposes of this Congress.

The most extensive bacteriological researches on diphtheria in this country have been made by Prudden and Park in the Pathological and Bacteriological Laboratories of the College of Physicians and Surgeons, Columbia College, New York (Director, Dr. T. M. Prudden), and by Park (partly in co-operation with Beebe) under the Division of Pathology, Bacteriology, and Disinfection, Health Department of New York (chief of this Division, Dr. Hermann M. Biggs); by Welch, Abbott, Booker, and Flexner in the Pathological Laboratory of the Johns Hopkins University and Hospital (Director, Dr. W. H. Welch); by Koplik, working in the Carnegie Laboratory, Bellevue Hospital Medical College (under the direction of Dr. E. K. Dunham); by Abbott, Ghriskey and Ravenel in the Laboratory of Hygiene, University of Pennsylvania (under the direction of Drs. J. S. Billings and A. C. Abbott); by Councilman, Williams, Morse, Townsend, Wright and Emerson in Boston, chiefly in the Boston City Hospital, and in the Pathological Laboratory of the Harvard Medical School (Director, Dr. W. T. Councilman). The references to articles are given at the end of this paper.

The writer is indebted for original abstracts of their work (some of it hitherto unpublished) and their preparation for this report, to Drs. Prudden, Park, Koplik, Abbott, Ravenel, Booker, Morse, Wright, and Emerson; and he desires to express to these gentlemen his cordial thanks for their kind co-operation, and also to Dr. Councilman for procuring the abstracts of work done under his supervision. It was intended at first to publish *seriatim* these abstracts, but it is believed that a systematic presentation of the combined results under suitable headings will be more useful. The purposes and limits of this report permit the statement of only some

¹ This committee, of which Dr. John S. Billings is Chairman, was appointed by the Secretary General of the Eighth International Congress of Hygiene and Demography, together with similar committees in other countries, to report to the Congress upon various questions relating to diphtheria. To the writer was assigned the subject of this report.

of the results of American workers, and these often in much abbreviated form. The writer, whose part is only that of a referee, will make free use, often without further acknowledgment, of the words of the authors. The larger part of the investigations of Park reported in this paper are unpublished. This report embraces the results up to May, 1894.

In accordance with the programme of the Congress, especial attention will be given in this report to the results thus far obtained in the United States as to the following points:

The application and value of bacteriological methods in the diagnosis of diphtheria; the proportion of cases of pseudo-membranous inflammations of the throat and air-passages due to the Loeffler bacillus; the various localizations of the diphtheria bacillus; atypical forms of diphtheria, and false diphtheria; the persistence of the Loeffler bacillus in the throat after recovery from diphtheria; the occurrence of this bacillus outside of persons affected with diphtheria; the characters of pseudo-diphtheria bacilli.

HISTORICAL.—The first bacteriological study of pseudo-membranous inflammations of the throat by modern methods in this country was by Prudden in 1889. He studied by microscopical examination and cultures twenty-four cases diagnosed as diphtheria in young children, most of them in New York hospitals in which the affection had assumed the character of an epidemic. In a few of these cases the pseudo-membranous inflammation occurred by itself, but in most of them it was associated with scarlatina, measles, or suppuration. In all but two of these cases he found a streptococcus, usually in large numbers in the local lesions and in small numbers in a few cases in the viscera. Loeffler's bacillus was not found in any of this group of cases.

Prudden has withdrawn the name streptococcus diphtheriæ, originally applied by him to the streptococcus found in these cases, which did not appear to differ from the streptococcus pyogenes. It is clear that the group of cases first studied by Prudden were not cases of genuine diphtheria, but were for the most part cases of secondary pseudo-membranous inflammations, which are now known to be oftener due to a streptococcus than to the Loeffler bacillus.

In February and March, 1891, Welch and Abbott published the results of the bacteriological examination of eight cases of primary diphtheria, in all of which the Loeffler bacillus was found.

In April, 1891, Prudden published the results in twelve cases of diphtheria unassociated with complicating lesions, and found the bacillus of Loeffler in all but one.

Since these first publications the number of cases of suspected or established diphtheria which have been examined bacteriologically in the United States, so as to be available for statistical analysis, has been between 6000 and 7000 (May, 1894).

Several hundred of these cases were examined in hospitals, dispensaries, and private practice, but by far the larger number were examined under the Health Department of the City of New York. Under the intelligent and efficient direction of Dr. Biggs the Health Department has entered upon an undertaking which, upon such a scale, is believed to be hitherto unparalleled, to wit: the systematic examination of all cases of suspected diphtheria (unless objection is made by the attending physician or except certain cases in which it is not deemed advisable to disturb the patient) occurring in New York—the study of the cultures thus obtained being made by Dr. William H. Park and Mr. Alfred Beebe, who are thoroughly trained and careful bacteriologists. Some of the results of this undertaking will be considered in this paper.

All the bacteriological aspects of diphtheria and other pseudo-membranous inflammations of the throat, with the exception of systematic study of immunization and serum-therapy, have been investigated by the various American workers already mentioned. Attention, however, will not be given in this paper to the purely morphological and cultural characters of the diphtheria bacillus, except as they relate to the question of differentiation of the pseudo-diphtheria bacillus.

TECHNIQUE.—In general the methods of examination have been those usually employed, and only a few points need to be especially mentioned.

To obtain the material for cover-slips and culture from the suspected throat, Park uses sterile cotton swabs made by wrapping firmly a small pledget of absorbent cotton around the roughened end of a thin, stiff steel rod six inches in length. These swabs placed in an equal number of glass tubes, plugged with cotton, are sterilized for one hour by dry heat at 150° C. A similar method is employed by Councilman and others in Boston. Koplik prefers, both to the cotton swab and to the ordinary platinum wire, especially for removing tonsillar plugs, a small sterilized thin scoop in the form of a long bent probe.

All are agreed as to the superiority of Loeffler's blood-serum mixture for making original cultures from the throat. The blood-serum mixture is now generally prepared by direct sterilization and solidification in the steam or hot-air sterilizer at a temperature a little below 100° C., instead of the old method of fractional sterilization at a lower temperature. The loss of transparency in the medium is compensated by the greater facility in preparation, and no difficulty is found in seeing the colonies after twelve to eighteen hours. Egg-albumen, as recommended by Johnston, and urine agar were found by Park less satisfactory than blood-serum.

While recognizing that the bacillus of diphtheria grows well on agar when planted from cultures on blood-serum or other media, and that the agar colonies are the most characteristic and best adapted for micro-

scopical study, Park calls attention to the uncertainty of glycerin-agar as a medium for making original cultures from the exudate. This uncertainty is due not only to unavoidable variations in the composition of the beef-broth, and to the less luxuriant character of the growth of the bacillus diphtheriæ as compared with its coincident growth with other bacteria upon blood-serum, but also to the observation that when the bacilli diphtheriæ are few in number or have been affected by previous application of antiseptics, they may fail to grow upon agar when blood-serum inoculated at the same time and with the same exudate presents growth of the bacilli. Of course, the use of antiseptics shortly before making the inoculation of the tube is likely to render the cultures useless.

When it is desired to determine accurately the kinds of bacteria associated in the exudate with the diphtheria bacillus, especially the presence of streptococci, it is desirable not to rely upon blood-serum alone, but to make also agar plates from the exudate.

In testing the virulence of diphtheria cultures emphasis is laid, in all of the later work, upon observing precautions which have been noted especially by Behring and by Escherich. Thus Koplik selects young guinea-pigs weighing from 350 to 450 grammes, and injects 0.1 to 0.5 cc. of a bouillon culture forty-eight hours old in the thermostat. The quantity injected should be taken from the full culture after shaking and not after pouring off the supernatant fluid from the deposit. Park also emphasizes the importance of selecting, if possible, young guinea-pigs and injecting $\frac{1}{4}$ to $\frac{1}{2}$ per cent., in special cases even 1 per cent., of the body-weight of a forty-eight hour bouillon culture grown at 37° C.

For ordinary diagnostic purposes cover-slip preparations and cultures are considered sufficient without awaiting the result of the animal experiment. In all of the cases both cover slip preparations and cultures were made, and in many also inoculation of guinea-pigs.

METHODS ADOPTED BY THE HEALTH DEPARTMENT IN NEW YORK.—Under the Division of Pathology, Bacteriology, and Disinfection, of which the Director of the Bacteriological Laboratory is Dr. Hermann M. Biggs, and the Inspector of Diphtheria Dr. William H. Park, the Health Department of New York has organized a system which renders available to physicians throughout the city the bacteriological diagnosis of diphtheria, and which utilizes in the interests of preventive medicine the important discoveries relating to the causation and mode of spread of diphtheria. These efforts have met, for the most part, with hearty co-operation on the part of physicians.

For carrying out this and similar work, a bacteriological laboratory has been equipped and competent bacteriologists and a force of physicians as inspectors are employed. Cultures are made, not only when

specifically requested by physicians, but also when no objection is raised by the attending physicians, diphtheria being, of course, a notifiable disease. Especial attention is given to examinations in boarding-houses, hotels, and tenement-houses.

In general, cultures are not made for diagnosis from secondary cases in families where the first case was proven bacteriologically to be diphtheria, or in cases of croup in which tracheotomy or intubation has been performed, the knowledge to be gained by cultures in such cases being too slight to compensate for the disturbance of the patient. All such cases, and, in fact, all suspected cases in which cultures are not obtained, are regarded as diphtheria. Later cultures are, however, made to determine when the bacilli have disappeared and the premises are ready for disinfection.

Indeed, especial importance is attached to these later cultures, for in view of an extensive research to determine the length of time during which diphtheria bacilli may persist in the throat, the Health Department has adopted the rule, "That no person who has suffered from diphtheria shall be considered free from contagion until it has been shown by bacteriological examination, made after the disappearance of the membrane from the throat, that the throat secretions no longer contain the diphtheria bacilli, and that until such examinations have shown such absence all cases in boarding-houses, hotels, and tenement-houses must remain isolated and under observation. Disinfection of the premises, therefore, will not be performed by the department until examination has shown the absence of the organisms." Cultures are made also from the apparently healthy throats in an infected household for reasons which will appear later in this report.

The culture-tubes may be inoculated by the attending physician, if he so desires; otherwise the cultures are made by the inspector of the district in which the case occurs. The outfits for making the cultures, consisting of a box containing a tube of blood-serum and a sterilized swab in a test-tube, are distributed to about forty stations at convenient points throughout the city, these being mostly druggist shops. A list of these stations is published, at which physicians can obtain the outfit free of cost.

Printed directions for making the cultures in suspected cases of diphtheria are supplied with the outfit, and are as follows:

"The patient should be placed in a good light, and, if a child, properly held. In cases where it is possible to get a good view of the throat, depress the tongue and rub the cotton swab gently, but freely, against any visible exudate.

"In other cases, including those in which the exudate is confined to the larynx, avoiding the tongue, pass the swab far back, and rub it freely against the mucous membrane of the pharynx and tonsils. Without

laying the swab down, withdraw the cotton plug from the culture-tube, insert the swab, and rub that portion of it which has touched the exudate gently but thoroughly all over the surface of the blood-serum. Do not push the swab into the blood-serum, nor break the surface in any way. Then replace the swab in its own tube, plug both tubes, put them in the box, and return the culture outfit at once to the station from which it was obtained.

"A report will be forwarded the following morning by mail, or can be obtained by telephone, after 12 noon."

There follows a list of the stations from which the culture-outfits can be obtained free of cost.

The inoculated tubes and swabs are sent from the stations to collecting depots, whence they are taken by the collectors on the same day to the laboratory. There is filled out and returned with the cultures a printed form giving the name and address of the attending physician and of the maker of the culture, the date, the name, age, and address of the patient, the clinical diagnosis, various details relating to the supposed causation, the duration and character of the disease, the use of antiseptic applications, and a statement as to whether the inoculation was satisfactory. Another printed form is to be filled out for later cultures.

From time to time explanatory circulars as to the character and results of the work and the rules adopted by the department are issued to physicians.

There are printed forms to be filled out in reporting to physicians the results of the cultures; one form is for cases in which diphtheria bacilli are found; another is for cases in which the bacilli once present have disappeared, and on this is the statement that the case is ready for disinfection, if other circumstances allow; a third form is for cases in which the cultures do not show the presence of diphtheria bacilli; and a fourth in the case of cultures which do not permit an exact bacteriological diagnosis with a statement of reasons for the failure, and, if need be, another culture is requested.

Specimens of these various printed forms accompany this paper for the inspection of those attending the Congress.

The results thus far obtained by this system have been satisfactory. From May 4, 1893, to May 4, 1894, 5611 cases of suspected diphtheria were subjected to bacteriological examination, some of the results of which will be stated later in this report.

As to the reliance to be placed upon a culture in making a diagnosis, Park states, as the result of the very large experience accumulated by the Health Department, "The examination by a competent bacteriologist of the bacterial growth in a blood-serum tube which has been properly inoculated and kept for fourteen hours at the body temperature can be thoroughly relied upon in cases where there is visible membrane in the

throat, if the culture is made during the period in which the membrane is forming, and no antiseptic, especially no mercurial solution, has lately been applied. In cases in which the disease is confined to the larynx or bronchi, surprisingly accurate results can be obtained from culture, but in a certain proportion of cases no diphtheria bacilli will be found in the first culture, and yet will be abundantly present in later cultures. We believe, therefore, that absolute reliance for a diagnosis cannot be placed upon a single culture from the pharynx in purely laryngeal cases. The apparent mistakes, however, have been few. Cultures cannot be certainly relied upon after the membrane begins to disappear."

The great majority of physicians desire cultures to be made and appreciate the value of an accurate diagnosis. Cases which are proved not to be diphtheria are not required to be isolated and are not kept under supervision by the Department; until such proof, however, suspicious cases are treated as diphtheria.

The duration of the period of isolation and the time for disinfection are determined by the bacteriological examination in accordance with the rule already quoted. The increased value of statistics as to the distribution, prevalence, mode of spread, clinical characters, mortality, and treatment of diphtheria when the diagnosis is based upon a bacteriological examination, requires no especial emphasis. Some of the scientific results which have been obtained by Dr. Park and Mr. Beebe from this immense material will be mentioned later in this article.

PROPORTION OF CASES OF SUSPECTED DIPHTHERIA PROVED BY BACTERIOLOGICAL EXAMINATION TO BE TRUE DIPHTHERIA.—There are several points to be considered in estimating the value of statistics upon this point. The character of the cases selected for examination, whether wholly characteristic or less characteristic of diphtheria, will be of decisive influence. The degree of suspicion in a given case may be very slight, or one physician may consider the case highly suspicious or certain, and another may regard it as very doubtful or certainly not diphtheria.

It is particularly in the doubtful cases that a bacteriological examination is desired and is of the most importance. Diphtheria may occur without any false membrane and as an angina or tonsillitis of very mild character.

In statistics based upon the statements of a large number of physicians as to the character of a local exudate it doubtless may happen that simple pultaceous and purulent exudates may be mistaken for genuine fibrinous exudates. The inclusion of cases of pseudo-membranous angina, occurring in scarlet fever or other diseases, or even during the prevalence of scarlet fever, will influence the statistical result. Special local conditions, such as the selection of cases exclusively from children's hospitals, and probably the time of year, may likewise have

an influence upon the result. The care with which the cultures and cover-slip preparations are made and examined, the period of the disease at which they are made, the previous local application of antiseptics, are factors which will influence the result.

These considerations (and still others might be mentioned) may render the statistics of different observers not strictly comparable, and they indicate that some statistics are likely to be more accurate and valuable than others.

We owe to Park and to Morse the most extensive statistics as to the subject now under consideration. In his first published series Park examined 140 pseudo-membranous cases uncomplicated with scarlet fever, in which the clinical diagnosis of probable diphtheria had been made. He found the Loeffler bacillus in 54 cases (39 per cent.). Of the 86 remaining cases the membrane was confined to the tonsils in 58, and these latter were all mild.

In his second published series, 104 uncomplicated cases were examined and the Loeffler bacillus was found in 73 (70 per cent.). Dr. Park has kindly furnished the writer his later, as yet unpublished, statistics (partly in co-operation with Beebe), which will be included in a report to the Board of Health of New York. In this third series, 5611 cases of suspected diphtheria occurring in New York during the year ending May 4, 1894, were examined bacteriologically. A few of these cases complicated scarlet fever, but the precise number of such cases is not stated. The Loeffler bacillus was found in 3255 cases (58 per cent.), and was absent in 1540 cases (27 per cent.). In 816 cases, although no diphtheria bacilli were found in the cultures, yet either because the cultures were made after the fourth day of the disease, or because the exudate was imperfectly obtained from the throat, or because the culture media had become contaminated or were too dry, the cases were considered to be of a doubtful nature as far as the bacteriological examination was concerned. If the doubtful cases be thrown out, which, however, it is hardly fair to do, as most of them are considered by Park not to have been diphtheria, we have, in 4795 cases of suspected diphtheria, about 68 per cent. of cases of true diphtheria, and 32 per cent. which were not diphtheria.

Morse found, in 301 cases without scarlet fever admitted to the diphtheria ward of the Boston City Hospital, the Loeffler bacillus in 217 (72 per cent.).

If we add all of the cases of suspected diphtheria in Park's and Morse's statistics we have 6156 cases, of which 3599, or 58.5 per cent., were proved bacteriologically to be true diphtheria. If we reject from Park's third series the cases in which the bacteriological examination was unsatisfactory we have 5340 cases, of which 67.5 per cent. were cases of true diphtheria.

Park's first series was remarkable on account of the small percentage of cases of true diphtheria. The examinations were made in February and March, and scarlet fever was very prevalent, diphtheria less so. His experience at this time he considers to have been exceptional, and it has not been repeated. His own conclusion is, from his later observations, that about 60 per cent. of the cases of suspected diphtheria in New York are true, and about 40 per cent. are false, diphtheria.

We are, of course, not to infer that only 60 per cent. of the cases which are considered by physicians to be undoubted diphtheria are really diphtheria, but that this is about the percentage of cases of genuine diphtheria in the pseudo-membranous inflammations of the throat in which there is more or less suspicion of diphtheria.

Upon each blank sent with a culture-tube by the Health Department of New York, a space is left for the voluntary recording of the clinical diagnosis by the physician. In 1210 cases of true diphtheria the physician's diagnosis was recorded. In 1011 the case was considered on clinical grounds to be diphtheria, in 102 to be doubtful, and in 87 to be probably false diphtheria. In 675 cases in which the diphtheria bacilli were absent a diagnosis of diphtheria was made in 50, the rest being all considered to be in doubt.

In this connection Park says: "The cases which present the characteristic appearances of well-developed diphtheria regularly contain in the pseudo-membranes abundant diphtheria bacilli. It is the slightly developed cases in which a culture is most needed. Here without cultures we need to go more by the history of exposure than the appearance of the case. In a family where an undoubted case of diphtheria existed, any form of sore throat, with or without exudate, in a child or adult, would be probably a case of diphtheria, while a similar-appearing tonsillitis or pharyngitis in a person who had not been exposed to diphtheria would be, in all probability, a case of ordinary non-diphtheritic throat inflammation." In only about one-half of the cases of diphtheria examined by the Health Department of New York did careful inquiry reveal any connection with other diphtheria cases.

The statistics which have been cited are based upon the examination of pseudo-membranous inflammations of the throat and air-passages mostly uncomplicated with scarlet fever.

Of particular significance is the outcome of Morse's study: that in no less than 28 per cent. of the cases admitted to the diphtheria ward of the Boston City Hospital, diphtheria bacilli were not found.

MEMBRANOUS CROUP.—Welch and Abbott, Booker, Williams, and others have reported cases of diphtheria in which the pseudo-membrane was confined to the larynx and lower air-passages. In Park's statistics there are 286 cases (283 children and 3 adults) in which the membrane was entirely or chiefly confined to the larynx or bronchi. In the cultures

from 229 of these the Loeffler bacillus was found, and 167 of these 229 cases showed no pseudo-membrane or exudate above the larynx, while in the remaining 62, although the larynx was mainly involved, there was also some membrane or exudate present on the tonsils or pharynx. In the remaining 57 no diphtheria bacilli were found, but of these, the cultures in 17 were unsatisfactory, leaving the bacteriological diagnosis doubtful. In the 40 cases in which the diphtheria bacilli were absent the disease was confined to the larynx or bronchi in 27, while more or less exudate or membrane was present on the tonsils or pharynx in 13. Of the cases of membranous croup in New York, therefore, at least 80 per cent. are diphtheria and only 14 per cent. were undoubtedly not diphtheritic. Cases of membranous croup were observed to be the origin of cases of characteristic pharyngeal diphtheria.

The comparatively small number of laryngeal cases examined is accounted for by the custom of the department inspectors not to make cultures in cases which have been intubated or which seem so sick that the family might think injury had been done by inserting the swab.

In a personal communication Dr. Park writes that he has no doubt as to the occurrence of non-diphtheritic pseudo-membranous laryngitis. He speaks of two cases in which the microscopical examinations and cultures made both during life and after death showed no diphtheria bacilli, but streptococci were present. Booker has reported such a case complicating measles.

FIBRINOUS RHINITIS; NASAL DIPHTHERIA.—Park reports 10 cases of fibrinous rhinitis in all of which the Loeffler bacillus was found. All were typical and of the usual benign character. In 9 the membrane was confined to the nose, and in one there was also slight fibrinous exudate on the tonsils. Only the 6 cases in his first series are reported in detail. In 4 the Loeffler bacillus was associated with streptococci and in 2 with staphylococci. The virulence of the diphtheria bacillus was tested in 5 cases. The bacillus from one case killed a guinea-pig in four days; those from two cases in five days, and those from two other cases rendered the guinea-pig sick, but the animals eventually recovered. In addition to this weakening of virulence Park found that the bacilli from the first six cases grew more feebly than usual both on blood-serum and agar, and died out in cultures sooner than usual.

Abbott has published 3 cases of fibrinous rhinitis, and Ravenel, working under Abbott's direction, has kindly sent me an account of 2 additional cases which he will publish. All of these 5 cases were of benign character, the membrane being confined to the nasal cavity. Two were in sisters in the same family. In all the Loeffler bacillus was present in the membrane; in 3 it was of the customary virulence, and in 2 it produced only local reaction, in large doses failing to kill even half-grown guinea-pigs.

Townsend observed in 14 cases of diphtheria, mostly of mild character, occurring in the Children's Hospital in Boston, 7 cases in which the nose was affected. Of the latter, in 5 cases the disease was primarily nasal, the membrane being confined to the nose in 4. These 4 cases of primary and exclusively nasal diphtheria were mild. In all the Loeffler bacillus of customary virulence was found. He emphasizes the case with which these primary nasal cases may be overlooked if the membrane remains confined to the nose, the importance of a bacteriological examination in all suspicious cases of nasal discharge, the mild character of many of the cases, their resemblance by superficial examination in some cases to an ordinary coryza, and the danger of such cases as sources of infection.

Park mentions an instance in which a child with only a slight nasal discharge, in which Loeffler bacilli were demonstrated, gave rise to diphtheria in four children, of whom two died. The first child came from a family in which there had been a case of diphtheria three weeks before.

CLINICALLY ATYPICAL DIPHTHERIA.—The most important bacteriological study of this subject has been made by Koplik, who has kindly furnished the following abstract of his work:

The writer has for the past three years directed his attention chiefly to the study of those forms of diphtheria which clinically do not present any of the classical local symptoms of the disease. The direct outcome of these studies has been to demonstrate how multiform diphtheria may be, from a clinical standpoint, in its various local manifestations. The first series of studies was published in the *New York Medical Journal*, August 27, 1892, and *Archives of Pediatrics*, September, 1892. In these papers the writer gave the results of studies of the following forms of diphtheria:

A. Cases in which there is from the onset and through the whole course of the disease no local manifestation of membrane, either *diffuse* or *punctate*. These cases may be so exceedingly mild in their course as to simulate a simple catarrhal angina, or they may be accompanied not only by anginal symptoms, but laryngeal symptoms, such as croupy cough and croupy breathing. In the latter case, early in the disease, we find upon the most careful inspection of the fauces no signs of membrane; later, this picture may persist, or there may appear punctate areas of membrane upon the tonsils or pillars of the fauces. The point of greatest moment, however, is that at first and for days the closest inspection of the fauces and epiglottis reveals no signs of membrane. The croupy cough and breathing reveals involvement of the larynx. Where only the cough is manifest it is to be presumed that in the larynx the condition is much like that found in the throat, an intense inflammation without membrane.

It is, of course, impossible to establish the exact anatomical conditions. In these cases I have fixed the diagnosis of diphtheria by scrapings from the tonsil and fauces. The most dangerous of these cases in spreading infection are those which present symptoms of a mild

catarrhal angina. The writer has published a series of cases occurring in the same family of children who presented these mild anginal symptoms. They communicated their anginal diphtheria to one another. Some of the cases developed membrane (punctate, in other cases diffuse of fauces and larynx), resulting in fatal laryngeal stenosis. On the other hand, the writer has published a series of cases of children who presented all symptoms of acute catarrhal angina, with signs of lacunar amygdalitis. In these cases the croupy cough and breathing were not present. These were not diphtheritic. The only test is the bacteriological one.

B. A class of cases in which the tonsils are covered by a pultaceous mass of exudate, and no consistent membrane. These cases may or may not be true diphtheria.

C. A large class of cases presenting punctate form of membrane; some of these spots of membrane may be isolated and minute on the tonsil; in some forms the specks of membrane are depressed in the surface of the tonsil. In other forms minute or larger ulcerations exist. These cases may be diphtheritic, and in the vast majority of cases are true diphtheria. In other cases we fail to find the Loeffler bacillus.

D. The most important class of clinically atypical diphtherias are those cases which begin or even run their entire course with the clinical local picture of a typical lacunar or follicular amygdalitis. In my last paper, entitled "Acute Lacunar Diphtheria of the Tonsils" (*New York Medical Journal*, March 10, 1894) these cases are divided into groups. In the first group of cases the course of the disease is that of an exceedingly mild lacunar or follicular amygdalitis. The fauces are injected, the tonsils are enlarged, there is an indication here and there of a lacuna, by a yellow spot; the lymph-glands at the angle of the jaw may or may not be enlarged; the constitutional symptoms are almost *nil*. Extraction of the contents of the lacunæ or follicles shows the presence of the bacillus diphtheriæ.

In the second group of cases the tonsils are more inflamed, the lacunar plugs protrude from the tonsils in the form of soft fibrinous masses; the patients seem quite ill, as if suffering from a severe amygdalitis. In these cases also the lacunar plugs are found to contain the Klebs-Loeffler bacillus in almost pure culture. Here also glandular nodes are found at the angle of the jaw. The course of these cases clinically is interesting; some never develop membrane as a mass on the tonsils; others after the third day develop distinct thick confluent membrane on the tonsils. Others remain lacunar in the local tonsillar picture, but develop laryngeal diphtheria, with croupy cough and breathing. In this class the lymph nodes at the angle of the jaw may be much enlarged in packets, or not much above what is found in ordinary anginas. These cases may give rise to other cases in the same family in which the course of the disease is that of a simple lacunar amygdalitis, but which upon examination prove to be true diphtheria.

The third group of cases are those in which the disease begins with the picture of severe lacunar amygdalitis, but the prostration of the patient is exceedingly great; the temperature may be low. There is great glandular swelling at the angle of the jaw. After a few days the prostration is much greater; there appears nasal discharge, and small shreds of membrane are discharged from between the much swollen tonsils. The tonsils themselves are now covered with one continuous

membrane, but here and there shreds are seen on the surface of the eroded tonsil. These cases are the septic lacunar diphtherias with nasal symptoms, and give a bad prognosis.

In a series of 39 cases of acute lacunar or follicular inflammation of the tonsils, 12 were proven to contain the Loeffler bacilli in the depths of the tonsillar lacunæ. Thus, fully one-third of the cases were diphtheria. It is not intended to draw any percentage conclusion from this, but it demonstrates how insidious an affection lacunar amygdalitis may be. (*New York Medical Journal*, March 10, 1894.)

Diphtheria sine membrana has been observed also by several other American investigators. Reference has already been made to Park's statement that any form of sore-throat in a person exposed to diphtheria is likely to be referable to the diphtheria bacillus. He says: "Under diphtheria should be included all inflammations of mucous membranes due to the diphtheria bacillus of Loeffler. A case with an acute hyperæmia of the mucous membrane in which the Loeffler bacilli are present is considered as truly a diphtheria as one with pseudo-membrane or exudate." Only the bacteriological examination can determine the true character of these cases. It is to be borne in mind, as pointed out by Councilman, that the absence of the pseudo-membrane in the places where it is ordinarily found is not proof that it is not present elsewhere, perhaps in some place not accessible to examination.

OTHER LOCALIZATIONS OF THE DIPHTHERIA BACILLUS AND ITS DISTRIBUTION AT AUTOPSIES.—Councilman has found the diphtheria bacillus in one case of otitis media following diphtheria and in two cases of otitis media, without affection of the throat, in measles. Townsend observed a case in which an old tracheotomy wound was attacked and the disease spread to the bronchi, proving rapidly fatal, with demonstration of the Loeffler bacillus. Park found diphtheria bacilli in two cases in wounds of the finger received by physicians in intubating children with diphtheria. In one case the bacilli persisted in the wound for six weeks. Wright (unpublished results communicated to the writer) has demonstrated the presence of this bacillus in excoriated or ulcerated surfaces of the skin in 7 cases, in paronychia in 1, in mastoid abscess in 1, in purulent conjunctivitis in 1—all in cases of diphtheria. At autopsy he cultivated the bacillus from the ecchymotic mucous membrane of the stomach in 2 cases, and from cedematous tissue behind the œsophagus in 1. Wright also reports that in 10 out of 14 autopsies in cases of diphtheria broncho-pneumonia was present, and that in 9 cases the Loeffler bacillus was found in the lung, and in the remaining case only the streptococcus. In 7 of the 9 pneumonias streptococci accompanied the Loeffler bacillus, as well as in two other lungs in which no pneumonia existed. In 3 or 4 pneumonias the diplococcus pneumoniæ was also present. The staphylococcus pyogenes aureus was also met in 4 pneumonias, once with the Loeffler bacillus and three times in company

with all of the three bacteria just mentioned. Flexner has found the Loeffler bacillus in two broncho-pneumonias complicating diphtheria, and by microscopical examination of sections demonstrated Loeffler bacilli, mostly within leucocytes, in the broncho-pneumonic exudate. In both cases the diplococcus pneumoniae was, however, the predominant organism.

Howard has reported a case of acute ulcerative endocarditis (without diphtheria) with infarctions in the spleen and kidneys, in which, both by cultures and microscopical examination, bacilli indistinguishable morphologically and in cultures from the diphtheria bacillus, but devoid of virulence, were found abundantly and in pure culture in the valvular vegetations, the spleen, and the kidneys.

As to the presence of the diphtheria bacillus in internal organs at autopsy Booker reports a case of diphtheritic laryngitis in which at autopsy Loeffler bacilli were found in the blood, spleen, and lungs. Wright has found this bacillus out of 14 cases dead of diphtheria in the lung in 13 cases (9 with broncho-pneumonia), in the liver in 3, in the spleen in 2, in the cervical or bronchial lymph-glands in 5, in the kidney in 1, in the blood in 1, and in the mesenteric lymph-glands in 2. In 7 of these cases there was streptococcus septicæmia and in 2 a similar poly-infection with the staphylococcus pyogenes aureus. Two of the autopsies showed no marked lesions of diphtheria in the throat or trachea, the nasal cavities not having been examined. Both yielded virulent Loeffler bacilli—in one from the cervical lymph-glands and in the other from the pharynx. In both the bacillus was found in the air-passages. The bacillus, with slight virulence, was found also in certain of the organs in 3 autopsies on cases apparently not dead of diphtheria.

In guinea-pigs dead of experimental diphtheria, Wright found the diphtheria bacillus in the liver in 19 out of 155 cases, in the spleen in 15 out of 152 cases, in the heart's blood in 7 out of 153 cases, and in the kidney in 4 out of 151 cases.

Both in these as well as in the human cases the bacilli were found in the organs in but very small numbers, as a rule.

In three guinea-pigs the bacillus has been recovered by Wright from the seat of inoculation thirty-one to thirty-eight days after the date of inoculation.

Abbott and Ghriskey have observed frequently after inoculation of diphtheria bacilli into the testicles, less frequently after subcutaneous inoculation, of guinea-pigs, small nodules in the omentum composed mostly of polynuclear leucocytes and containing the bacilli in large number.

Welch and Flexner have described in detail the histological changes in experimental diphtheria, and have shown that these are characterized especially by widely distributed areas of cell death with nuclear frag-

mentation. They have demonstrated that the local fibrinous exudate may be caused by dead, as well as living, diphtheria bacilli, and that the other lesions are referable to toxic products of the bacillus.

BACTERIA ASSOCIATED WITH THE DIPHTHERIA BACILLUS.—All of the investigators have found, as a rule, other bacteria associated with the Loeffler bacillus in the local exudates of diphtheria, although this bacillus is the only one which is constantly present. The most common associated micro-organism is the streptococcus pyogenes. Other bacteria which have been found are the regular buccal bacteria, the micrococcus lanceolatus, the staphylococcus albus and aureus, the bacillus coli communis (Morse), unnamed cocci and unnamed bacilli. Among these bacilli may be specified a short oval, slightly pointed bacillus, growing in long chains, running parallel to each, forming grayish-white colonies on agar not unlike those of the Loeffler bacillus. This bacillus was frequently encountered by Welch and Abbott. Morse describes a short, motile, liquefying bacillus and a non-motile diplo-bacillus growing invisibly on potato and not growing on gelatin. The only associated bacteria which are believed to exert pathogenic action are the streptococci, the pyogenic staphylococci, the micrococcus lanceolatus, and a coccus observed by Koplik which he considers to be identical with that described by Roux and Yersin and by Martin. Differences, mostly of a minor character, have been noted both in morphology and cultural characters between the different streptococci, but they are not considered sufficient to establish definitely different species.

It is regarded as established by all the investigators that the course and symptoms of diphtheria may be definitely influenced by these associated pathogenic bacteria, particularly by the most common of all, the streptococcus pyogenes. Cases of general streptococcus septicæmia accompanying diphtheria have been observed, especially by Councilman and his co-workers. Broncho-pneumonias, suppurations of lymph-glands and the so-called septic forms of diphtheria are attributed to these associated bacteria, especially to the streptococcus. It does not appear, however, either from the statistics of Park or of Morse, that the mortality is materially higher in cases of diphtheria in which the streptococcus is associated with the Loeffler bacillus than when the Loeffler bacillus is present without streptococci. In fact, the tables of Morse show a higher mortality when the Loeffler bacillus is associated with pathogenic staphylococci than with streptococci. Morse, however, does not attach decisive weight to this inference, as only in 25 cases did he attempt a thorough differential study of all associated bacteria. Such study will always show the presence of other bacteria. In these 25 cases he found the streptococcus in 19 cases (9 without other bacteria in culture, except the Loeffler bacillus, 6 with staphylococcus aureus or albus, or both), and staphylococcus aureus or albus in 10 cases (4 alone,

except the Loeffler bacillus). The general mortality in these 25 cases was 56 per cent., the mortality in the cases with the Loeffler bacillus and streptococci alone, 33 per cent., with Loeffler bacillus and staphylococci alone, 66 per cent., and with Loeffler bacillus, streptococci, and staphylococci, 66 per cent. As Morse says: "Statistics compiled from so small a number of cases are of little value." A similar conclusion as to the greater harmfulness of staphylococci than of streptococci is reached by Morse, contrary to the generally accepted opinion, also from the analysis of his larger table of 400 cases (301 without scarlet fever); but he admits that the comparatively small number of cases in which the streptococcus was found associated with the Loeffler bacillus (191 cases) may have been due to failure to recognize the minute, slow-growing colonies of streptococci in the twenty-four-hour blood-serum tubes, and the arrangement of the cocci on cover-glass specimens alone is not decisive as to the diagnosis of staphylococci, which were found in 295 cases. A minute and careful differentiation of the bacterial species was attempted by Morse in only 25 cases. We cannot, therefore, consider it established that staphylococci are more harmful than streptococci, especially as this inference is opposed to that of other investigators, and as Morse doubtless often overlooked the presence of streptococci.

PSEUDO-MEMBRANOUS INFLAMMATIONS OF THE THROAT IN SCARLET FEVER, MEASLES, AND TYPHOID FEVER.—In an epidemic of scarlet fever in Baltimore at the time when the city was unusually free from diphtheria, one-half of the cases seen by Booker had pseudo-membranous affection of the throat. He has reported 11 cases of pseudo-membranous angina (2 fatal) complicating scarlet fever, and 1 case of similar angina without exanthem in a family three members of which had scarlatina. In all of these cases, as well as in 4 scarlatinal anginas without pseudo-membrane, Booker found streptococci as the predominant organisms, and in none was the Loeffler bacillus present. In one case croupous conjunctivitis due to streptococci was associated with the pseudo-membranous angina. The staphylococcus aureus was found in 11 cases without apparent influence on the severity of the case. No difference was observed between the early and the late pseudo-membranous anginas as regards the bacteria present. He attributes the absence of true diphtheria from so large a number of cases of scarlatina as due to the freedom of the city from diphtheria at the time. Booker describes with much detail the morphological and biological characters of the streptococci found, and divides them into groups, but these details will not here be considered.

Park in his first series of 159 cases reports 19 cases of pseudo-membranous inflammation of the throat complicating scarlatina. In 17 streptococci predominated, and in only 2 were Loeffler bacilli present,

these latter presenting diphtheritic laryngitis. Staphylococci were met in only a few cases.

The experience in Boston, as reported by Williams and by Morse, has been exceptional in the large proportion of cases of true diphtheria complicating scarlet fever. Of 97 cases of scarlet fever in the Boston City Hospital, of which 35 came from two homes for children, reported by Williams, membranous throats were present in 35. Of these 12 were due to the Loeffler bacillus, and in 23 the Loeffler bacillus was not found. In the 23 pseudo-diphtheria cases the membrane was limited to the tonsils in 5 only, and in 3 it extended to the larynx. Of the 62 cases of scarlet fever alone, 8 died (13 per cent.), of the cases of scarlet fever with diphtheria 6 died (50 per cent.), of the 23 cases of scarlet fever with pseudo-diphtheria 5 died (22 per cent.). In a previous series of 86 cases of scarlet fever, of which 19 were complicated with membranous throats, but no bacteriological examination was made, the mortality in the latter group was 47 per cent., while in the 67 cases without membranous throats only 4½ per cent. died.

In Morse's paper are probably included some of the cases reported by Williams, as the observations of both are from the Boston City Hospital. Morse reports 99 cases of pseudo-membranous inflammation of the throat complicating scarlet fever. Of these 26 per cent. died. The Loeffler bacillus was found in 23, with a mortality of 43 per cent., and was not found in 76, with a mortality of 21 per cent. In the pseudo-diphtheric cases streptococci were present in 61, staphylococci (in 12 alone and in 57 with streptococci) in 69, and other bacteria in 3 cases. Mention has already been made of the large number of staphylococcus cases in general in Morse's statistics.

It is the opinion of Morse, and of Councilman, under whose direction Morse worked, that the large proportion of cases of combined scarlatina and diphtheria was due to contagion in the hospital where the conditions were unfavorable for proper isolation. These unfavorable conditions will be remedied in the new hospital for infectious diseases now building. A few of the mixed cases, however, were admitted with double infection as shown by bacteriological examination at entrance. Most of the cases came from tenement-houses. In Williams' cases the fact that 35 came from two public institutions may explain in part the large number of associated infections.

In contrast with these results in Boston it is interesting to note the observations of Booker, already cited, at a time and place in which diphtheria was notably absent. It is evident that the proportion of cases in which true diphtheria complicates scarlet fever depends largely upon local conditions, these relating to the prevalence of diphtheria and the opportunities for contagion.

Booker reports three cases of pseudo-membranous inflammation

accompanying measles. In all, streptococci and the staphylococcus aureus were found, and in none the Loeffler bacillus. These cases occurred during the same period as the scarlatinal cases, when the city was exceptionally free from diphtheria. In two cases the membrane was limited to the larynx, there being no visible exudate. One of these was fatal, and at the autopsy the whole larynx was covered by a tough, very loosely adherent, false membrane. Both microscopical examination and cultures of the membrane after death, as well as those made from the pharynx during life, failed to show Loeffler bacilli. This case, therefore, is a particularly conclusive one of the occurrence of membranous laryngitis without diphtheria. The third case presented pseudo-membrane on the tonsils, pharynx and conjunctivæ. Streptococci predominated with some colonies of the staphylococcus aureus.

In Park's first series of cases there is one case of laryngeal diphtheria accompanying measles. Loeffler bacilli were present. The child recovered after intubation. In another case, in which there was membranous laryngitis without diphtheria bacilli in the pharynx, measles developed on the eighth day. Intubation had been performed and was followed by recovery.

Williams reports one case of measles with diphtheria. This case, however, may be the same one as appears in Morse's statistics, who reports four cases of measles with severe throat symptoms giving rise to the clinical diagnosis of diphtheria. One contained a few Loeffler bacilli and many staphylococci. Of these two died. Six cases had measles and scarlet fever together, but it does not appear that any of these had membranous throats. All recovered, and the Loeffler bacillus was not found in any. Streptococci were present in 5, staphylococci in 2, and the diplococcus lanceolatus in 2.

Of particular interest are four cases of typhoid fever complicated by diphtheria, reported by Morse. At least three of the cases developed diphtheria after admission to the hospital. One was a patient ill with typhoid fever in a private room. A nurse, several days after leaving the scarlet fever ward, had a sore throat, and was put in the same room over night. On the discovery of the Loeffler bacillus in her throat the next day, the nurse was transferred to the diphtheria ward. Four days later the patient with typhoid fever developed sore-throat with membrane containing the Loeffler bacillus. The next day a typical scarlet-fever rash developed, which was followed by desquamation. She ultimately recovered. One of the four patients died. At the autopsy were found lesions of typhoid fever with diphtheritic pharyngitis, tonsillitis and laryngitis. Loeffler bacilli were demonstrated both *intra vitam* and *post mortem*. In addition, typhoid bacilli and general streptococcus infection were found in cultures after death. Wagner has already

called attention to the greater frequency of pseudo-membranous affections in typhoid fever when diphtheria is prevalent.

PSEUDO-DIPHTHERIA.—The name pseudo-diphtheria is used by Park, Williams, and others to designate pseudo-membranous inflammations of the throat and air-passages not caused by the bacillus of diphtheria. The name is, for several reasons, objectionable, but no convenient substitute has been suggested. The term streptococcus diphtheritis fits most of the cases, but not all. The pseudo-diphtheria bacillus is not concerned in the causation of pseudo-diphtheria, or, if so, only in a very small number of cases.

We have just seen that the great majority of cases of pseudo-membranous angina in scarlet fever are due to streptococci, although under special conditions the proportion of diphtheritic cases may be exceptionally large.

The statistics as to the proportion of cases of pseudo-membranous inflammations of the throat not due to the diphtheria bacillus, exclusive of scarlatinal cases, occurring in New York and Boston, have already been given under the headings "Proportion of Cases of Suspected Diphtheria Proved to be Diphtheria," and "Membranous Croup." From these it appears that from about 28 to 40 per cent. of the cases of non-scarlatinal pseudo-membranous anginas are pseudo-diphtheria, the percentage in some series being larger and in others smaller. The high percentage of such cases in Park's first series is altogether exceptional and probably due to special circumstances, among which Park mentions particularly the prevalence of scarlatina, the relative infrequency of true diphtheria, and the season of the year (February and March). Park writes that since then he has found the diphtheria bacillus in a series of cases in over 80 per cent.

Several foreign writers have been impressed with the large number of American cases of pseudo-membranous angina and laryngitis in which diphtheria bacilli were not found, and have expressed some doubt as to the accuracy of the results. We attribute the striking differences in the reported statistical results of different investigators mainly to the class of cases selected for examination. If only typical and characteristic cases of diphtheria, be selected, as has been done by some observers, the proportion of cases in which the diphtheria bacillus is missed will be small, and may be *nil*. If, however, the less characteristic cases of diphtheria, concerning which, in many instances, no one can be sure without bacteriological examination whether they are genuine diphtheria or not, be included, there may be a relatively large percentage of cases of pseudo-diphtheria. Foreign statistics, based upon the examination of cases admitted to the diphtheria wards of hospitals, in which cases, therefore, the clinical diagnosis is diphtheria, such as the statistics

of Baginsky, in Berlin, Martin, in Paris, and Jansen, in Switzerland, agree substantially with the New York and Boston statistics.

Koplik and Park describe with much detail the anatomical and clinical characters of the less characteristic diphtheritic and of the pseudo-diphtheritic cases. Koplik's observations as to the former have already been cited. In these less characteristic cases neither the location nor the character of the diphtheritic inflammations of the throat suffice to distinguish positively the true from the false diphtherias, and a positive diagnosis must rest upon the bacteriological examination.

In the great majority of cases which have been examined with sufficient care, a streptococcus, not differing apparently from the streptococcus pyogenes or erysipelatis, has been the predominant organism in pseudo-diphtheria and is believed to be the cause of this affection. In a small number of cases generally, but in Morse's examinations in a large number of cases, staphylococci appear to have been the causative micro-organism. In a still smaller group of cases the diplococcus lanceolatus has been assigned as the causative factor. Koplik has met the coccus of Roux and Yersin. He also reports four cases of tonsillitis without membrane in which the pseudo-diphtheria bacillus was found without the typical virulent diphtheria bacillus.

Park reports the mortality in 408 consecutive cases of pseudo-diphtheria bacteriologically examined in New York, and not complicating scarlet fever, to have been only 1.7 per cent. Of the seven fatal cases only two were over five years of age. The five deaths in young children were all in laryngeal cases. He considers that nearly all of the deaths in pseudo-diphtheria are due to complications, the most important being scarlet fever, membranous laryngitis, and broncho-pneumonia. At the same period the mortality from true diphtheria in New York was 27 per cent.

In striking contrast to this low mortality in pseudo-diphtheria is that found by Morse in the Boston City Hospital, where 25 per cent. of the pseudo-membranous cases without Loeffler bacilli and without scarlet fever died. The difference between Park's and Morse's results is probably to be explained by the fact that Park's cases were largely the usual mild ones in private practice, whereas Morse's cases were of sufficient severity to be sent to the hospital, many being laryngeal cases, and many dying within twenty-four hours after admission, the great majority being young children from crowded and insanitary tenement districts. The mortality in true diphtheria uncomplicated with scarlet fever was in Morse's cases 41 per cent. Park also has noted the greater mortality of pseudo-diphtheria in the hospital cases as compared with those in private practice.

As is well known, there is much difference of opinion among physicians as to the contagiousness of throat affections due to streptococci and other cocci. In order to determine this point, the Health Department of New

York, as reported by Park, investigated 113 consecutive cases of pseudo-diphtheria occurring in 100 families, and at the same time 70 consecutive cases of diphtheria in 50 families. A history of contact with another case was found in 14 of the 113 cases of pseudo-diphtheria, and in 33 of the 70 diphtheria cases. In 9 of the 100 families with pseudo-diphtheria there was more than one case, and in 13 of the 50 families with diphtheria there was more than one case. It did not seem in an investigation of 500 cases of pseudo-diphtheria that secondary cases were any less liable to occur where the primary case was isolated than where it was not. It is considered that where two cases occurred in a family together, or within a short period of each other, they may have been due to some common exposure rather than to direct contagion. Park believes that in the majority of cases of pseudo-diphtheria the streptococci concerned are those already existing in the healthy throat, and that the presence of certain infectious diseases and exposure to cold, dampness, and insanitary surroundings, are among the exciting causes. While not denying the possibility of contagion, he considers that the degree of communicability is only moderate and of minor importance. Even admitting the possibility of contagion, he argues that the very slight mortality in uncomplicated pseudo-diphtheria justifies the rule of the Health Department in not keeping this class of cases under supervision after they have been proved bacteriologically not to be true diphtheria. The question of isolation is thus left to the discretion of the attending physician.

That a comparatively small number of cases of membranous croup are due to streptococci has already been stated. Woods has reported two cases of croupous conjunctivitis following measles, in which streptococci, but no Loeffler bacilli, were found.

PERSISTENCE OF DIPHTHERIA BACILLI IN THE THROAT DURING AND AFTER CONVALESCENCE FROM DIPHTHERIA.—During the ten months preceding May, 1894, Park with his co-workers in the Health Department of New York has examined 752 cases of diphtheria with reference to the length of time the diphtheria bacilli remain in the throat. Cultures were made at the beginning of the disease, and again at short intervals after disappearance of the exudate, until the throat was found free of diphtheria bacilli. The custom was to make the second culture three days after the complete disappearance of the membrane, and then to repeat the culture as long as necessary every fourth or fifth day. In 325 of these 752 cases the diphtheria bacilli disappeared within three days after the complete disappearance of the exudate; in 427 cases the diphtheria bacilli persisted for a longer time, viz: in 201 cases for 5 to 7 days; in 84 cases for 12 days; in 69 cases for 15 days; in 57 cases for 3 weeks; in 11 for 4 weeks, and in 5 for 5 weeks. In a case recently communicated to the writer by Park the bacilli were found 7 weeks after disappearance of the membrane.

The virulence of the diphtheria bacilli after recovery is reported by Park in 14 cases, the bacilli being obtained at intervals of 10 to 44 days after the inception of the disease. Eight guinea-pigs died within 40 hours, and one in each of the following periods: 60-70 hours, 5 days, 8 days, 9 days, 11 days, and 14 days. One guinea-pig survived after extensive local necrosis. He concludes that the diphtheria bacilli which persist in the throat after an attack of diphtheria are always virulent for some time. In those exceptional cases in which the bacilli persist for a very long time they are found occasionally to lose their virulence a few days before their final disappearance, while in other cases they retain their virulence to the end. In one case the bacilli were virulent 8 weeks after the onset of the disease and 7 weeks after the disappearance of the membrane. That the cases themselves do not seem so liable to spread diphtheria is probably largely on account of the relatively small number of the bacilli in the convalescent throats, as compared with those showing the lesions of diphtheria. Reference has already been made to the rule of the Health Department to keep cases of diphtheria under supervision until the diphtheria bacilli have disappeared, and to practise disinfection as soon as they have vanished from the throat.

Park reports that thorough irrigation of the throat and nose with 1 to 4000 bichloride of mercury solution every few hours was attended by disappearance of the bacilli within three or four days after disappearance of the false membrane in from one-half to two-thirds of the cases. In the remaining cases the bacilli persisted from four to twenty days, notwithstanding the application of the bichloride solution. The duration of persistence of the bacilli with irrigation with simple salt-water was three days less than with bichloride irrigation.

Where cultures cannot be made it is recommended to continue the isolation of diphtheria patients for at least three weeks after the disappearance of the membrane.

Morse investigated twenty-five cases of diphtheria with reference to the length of time the diphtheria bacilli persist in the throat and nose. He found the average duration of their presence after disappearance of the membrane to be ten days, and this to be the same for both throat and nose, although they were found longer in the throat in some cases, and in the nose in others. The bacilli disappeared in one case the day after the throat was clear; in three, three days after, and in one, four days after. In two cases in which the bacilli were never found in the nose, they remained in the throat ten and seventeen days respectively. In other cases they were present: in the throat thirty-seven days, in the nose thirty-six days; in the throat twenty-two days, in the nose eighteen days; in the throat ten days, in the nose seventeen days; and in both twenty-seven days. The bacilli obtained after ten days were found of usual virulence; in other cases of this group the virulence is not

recorded. Patients are not permitted to leave the hospital until the diphtheria bacilli have disappeared from both throat and nose.

PRESENCE OF DIPHTHERIA BACILLI IN HEALTHY THROATS OF PERSONS EXPOSED TO DIPHTHERIA.—An interesting investigation has been carried out by Park to test the frequency with which the healthy throats of children contain diphtheria bacilli in families where a case of diphtheria exists and where little or no isolation is undertaken. The throats of fourteen families were investigated, in which there were forty-eight children. In 50 per cent. of these virulent diphtheria bacilli were found; 40 per cent. developed later, to a greater or less extent, the lesions of diphtheria. It is noted in Park's paper that, in these families, the conditions were the best possible for the transmission of the bacilli from one to the other. In families where the case of diphtheria was well isolated, the bacilli were found in less than 10 per cent. of the children.

The cases, as well as others to be mentioned presently, in which virulent diphtheria bacilli are found, sometimes in large number, in healthy throats of persons who do not develop diphtheria, prove that virulent diphtheria bacilli may be present in the throat and multiply there without causing any visible lesions. As has recently been pointed out with much clearness by Escherich, in order to cause diphtheria they must find susceptibility to their pathogenic action, which susceptibility may be local, or general, or both.

It is, for several reasons, of practical value to make bacteriological examinations of the healthy children's throats in families where diphtheria has developed, or who have been exposed to diphtheria, especially where isolation is defective. Experience has shown, as appears from Park's paper, that antiseptic irrigations and cleansing treatment of the throat in such cases greatly reduce the liability to develop diphtheria.

The dissemination of the disease is prevented by isolating those in whom the diphtheria bacilli are found. Doubtless, not a few cases of diphtheria of obscure causation are referable to those who without the symptoms and lesions of diphtheria carry about the virulent bacilli.

Park says: "All members of an infected household should be regarded as under suspicion, and in those cases where isolation is not enforced the healthy as well as the sick should be prevented from mingling with others until cultures or sufficient lapse of time give the presumption that they are not carriers of contagion."

For interesting illustrative cases and further details on this important matter, Park's paper should be consulted.

PRESENCE OF DIPHTHERIA BACILLI IN HEALTHY THROATS WHERE NO HISTORY COULD BE OBTAINED OF EXPOSURE TO DIPHTHERIA.—Park and Beebe examined the healthy throats of three hundred and thirty persons in New York who gave no history of direct contact with diph-

theria. They found non-virulent, but otherwise characteristic, diphtheria bacilli in twenty-four, virulent characteristic diphtheria bacilli in eight, and non-virulent pseudo-diphtheria bacilli in twenty-seven. The virulence was tested by inoculating half-grown guinea-pigs with $\frac{1}{2}$ to 1 per cent. of their weight of forty-eight-hour bouillon cultures grown at body temperature. The non-virulent diphtheria bacilli produced acid in bouillon, and did not differ morphologically or in cultures from virulent diphtheria bacilli. Such bacilli are not regarded by Park as pseudo-diphtheria bacilli, but as genuine diphtheria bacilli devoid of virulence. The pseudo-diphtheria bacilli usually clouded bouillon and did not render it acid, and presented the usual characters of the pseudo-diphtheria bacilli to be described subsequently.

The non-virulent but otherwise characteristic diphtheria bacilli were abundant in the primary cultures from seventeen throats, and present in small number in the cultures from seven. In only one guinea-pig was there appreciable reaction after inoculation. Two hundred and eighty of the cases from which the cultures were made were children under twelve years of age (bacilli in twenty-two cases), while fifty were adults (bacilli in two). The non-virulent diphtheria bacilli persisted in four of the throats for four weeks, in one for three weeks, and in three for two weeks.

Of the eight cases in which virulent diphtheria bacilli were found, five were children in an asylum where from time to time cases of true diphtheria had occurred. Of the remaining three, one was from a house where a case of supposed croup had existed three weeks before. Two of the eight children developed diphtheria some days after making the cultures. The other six never developed any symptoms of diphtheria. The guinea-pigs inoculated with the cultures died in from twenty-eight to forty hours.

From the groups of cases studied under this and the preceding headings Park concludes that virulent diphtheria bacilli are present in probably about 1 per cent. of the healthy throats in New York City. Most of the persons in whose throats they exist have been in direct contact with cases of diphtheria. Many of those whose throats contain the virulent bacilli never develop diphtheria.

OCCURRENCE OF DIPHTHERIA BACILLI OUTSIDE OF THE HUMAN BODY.—In his first paper Park says that cultures made from the dried stains on spreads, pillow-cases, and sheets, where soiled by the expectoration of diphtheria patients, showed in every case a few colonies, at least, of the Loeffler bacillus. The sputum of patients, though apparently free from bits of membrane, usually contained the bacilli in large number.

Important results have been obtained by Wright and Emerson, who have kindly furnished the writer an abstract of their unpublished work so far as it has yet been carried. They made cultures on blood-serum

from the clothing, shoes, hair, and finger-nails of nurses in attendance on diphtheria patients, and also from the dust and various objects within the diphtheria ward of the Boston City Hospital. This ward contains seventy beds, which are generally nearly all occupied. The hygienic condition of the ward is stated to be good. Material, such as dust, etc., was collected for the most part on a sterilized platinum wire and applied to the surface of the culture medium. About twenty cultures in all have been made, of which five yielded Loeffler bacilli in small numbers. In all of the positive cases the bacilli isolated in pure culture were tested thoroughly as to their virulence and their morphological and cultural characters, and positively identified. In the latter respect all were characteristic diphtheria bacilli. It may be especially noted that all rendered bouillon acid within forty-eight hours. In two of the five cases the bacilli were of usual virulence, in two they were weakened in virulence, although killing guinea-pigs, and in one they caused only local reaction from which the animal recovered. The virulence was tested by inoculating guinea-pigs subcutaneously with $\frac{1}{2}$ to 1 per cent. of their weight of twenty-four- to forty-eight-hour bouillon cultures. From eight inoculated guinea-pigs which died, the characteristic bacilli were recovered in each instance, even when death occurred after some weeks.

The Loeffler bacilli were found on three shoes, each belonging to a different nurse, once on the hair of a nurse, the culture being taken from the hair above the ear, and once on a brush used in sweeping the floor of the ward.

The weakening of the virulence in two cases (in one case the guinea-pig died after seven and one-half days, and in another after some weeks, bacilli from each being recovered from the seat of inoculation) and the production of only slight local reaction from which the animal recovered in the case in which the bacilli were found on the hair of a nurse, suggest attenuation of virulence by unfavorable environment.

These suggestive observations of Wright and Emerson tell their own story and need no special comment.

No observations have been reported in this country of diphtheria as a spontaneous affection of domestic animals. Abbott was unable to confirm Klein's observations of the elimination of diphtheria bacilli through the milk of cows inoculated with virulent cultures of the Loeffler bacillus.

METHODS OF DISSEMINATION OF DIPHTHERIA.—How manifold may be the modes of conveyance of the diphtheria bacillus, and how obscure and difficult or even impossible to trace may be the origin of some cases of diphtheria, is evident from observations which have been mentioned. Park from his rich experience summarizes and illustrates with interesting examples some of the ways in which the diphtheria germ may be transported.

Here we cannot do more than enumerate some of the sources of infection which have been established by bacteriological investigations, to wit: the pseudo-membranes, exudates and discharges of diphtheria patients, both those with typical diphtheria and those with mild and little characteristic forms of the disease; infected clothing, bedding, and other objects; occupying rooms where diphtheria has existed; convalescent or recovered cases in whom the diphtheria bacilli persist; persons who have been in contact with others having diphtheria bacilli on their persons or clothing, or with infected objects, such persons sometimes carrying diphtheria bacilli in their throats for days or weeks without lesion. The investigations of Wright and Emerson show on what varied objects the diphtheria bacilli may be carried. Park traced one group of cases of diphtheria to a candy-store kept by a family in which occurred a case of diphtheria. Children who bought candy at this store acquired diphtheria, and other children who came in contact at school with the healthy children of this family also developed diphtheria.

The investigations of the Health Department indicate that at present the whole tenement-house district of New York is an infected area. In plotting out on a map the distribution of cases of diphtheria in New York it was interesting to note two types of epidemics, one essentially of neighborhood infection, the other in which the cases could be attributed to infection at school. It was observed that a whole school district would suddenly become the seat of scattered cases. At times, in a certain area of the city from which several schools drew their scholars, all the cases of diphtheria would occur in families whose children attended one school, the children from the other schools being for a time exempt.

In about one-half of the cases of diphtheria in New York careful inquiry failed to show connection with other cases.

Influences which increase susceptibility to diphtheria doubtless play a rôle in determining the development of the disease. The majority of adults and many children are insusceptible. What these predisposing influences are we do not know, save the influence of age. That special local conditions, the presence of throat affections and the association of the diphtheria bacillus with other micro-organisms, particularly streptococci, are predisposing factors seems highly probable. It is also probable that the degree of virulence of the diphtheria bacillus and the number of bacilli received into the body must be taken into account.

We possess no evidence that the diphtheria bacillus finds a natural home outside of the human body, although it may survive for months on objects outside of the body. Park found living diphtheria bacilli on bits of membrane dried for seventeen weeks, and in blood-serum cultures seven months old.

PSEUDO-DIPHTHERIA BACILLUS.—The various questions relating to the pseudo-diphtheria bacillus have been investigated by Abbott, Koplik, and Park.

In fifty-three cases of various throat affections, mostly without suspicion of diphtheria, examined bacteriologically by Abbott, he found in three bacilli indistinguishable morphologically or in cultures from the Loeffler bacillus, but entirely devoid of virulence, as tested repeatedly on guinea-pigs. One of the cases was suspicious of diphtheria, there being a grayish membrane on the tonsils; one was a case of syphilitic pharyngitis without membrane, and the other was follicular tonsillitis. From a fourth case of this series with a grayish-white deposit on the tonsils, Abbott cultivated a bacillus resembling the Loeffler bacillus, but somewhat thicker, growing more luxuriantly on agar, clouding bouillon and growing visibly on potato, exceptionally invisibly. This bacillus was wholly non-pathogenic for guinea-pigs. As already mentioned, Abbott and his pupil, Ravenel, have found in two cases of membranous rhinitis bacilli indistinguishable from the Loeffler bacillus except that they failed to kill guinea-pigs, although producing local reaction.

Abbott's conclusion is that the diphtheria bacillus varies in its virulence and that non-virulent varieties of the bacillus occur. He says that the name pseudo-diphtheria bacillus should not be applied to those bacilli which possess all of the morphological and cultural characters of the Loeffler bacillus and are devoid of virulence. These are simply non-virulent diphtheria bacilli. He reserves the term pseudo-diphtheritic bacillus "for that organism or group of organisms (for there are probably several) that is enough like the diphtheria bacillus to attract attention, but is distinguishable from it by certain morphological and cultural peculiarities aside from the question of virulence."

Koplik does not seem to have met with a bacillus presenting all the morphological and cultural properties of the virulent diphtheria bacillus but devoid of virulence. He emphasizes the importance, in testing virulence, of observing the precautions especially signalized by Behring and by Escherich, as already mentioned, and gives examples showing that mistakes on this point can readily be made where old cultures and insufficient doses are used. Koplik has, however, in six cases out of a large number examined found the pseudo-diphtheria bacillus essentially as described by Hoffmann, and he would limit the name pseudo-diphtheria bacillus to the bacillus presenting these definite characters. This pseudo-diphtheria bacillus he describes in his first article as shorter and slightly plumper than the real bacillus, but subsequently he describes it as an exact counterpart of the Loeffler bacillus in shape, size, and staining peculiarities, with the exception of deeper staining with methylene-blue. Actual measurements do not show any constant difference in thickness or length from the Loeffler bacillus. It grows upon blood-serum, potato, and gelatin, like

the genuine bacillus. Upon agar the growth is always more luxuriant, thicker and whiter than that of the real bacillus. In alkaline peptone bouillon the pseudo-bacillus causes in twenty-four hours diffuse clouding with abundant deposit. The reaction remains distinctly alkaline. Koplik communicates to the writer an unpublished observation to the effect that if the pseudo-bacillus be cultivated in closed tubes of Pasteur pattern, from which the oxygen has been absorbed by pyrogallate of potassium, there is an abundant sediment with diffuse clouding of the bouillon, and in forty-eight hours the reaction is found to be acid. Neither aërobic nor the acid anaërobic cultures are lethal to guinea-pigs, even in enormous doses. Nor does the preparation of an animal for weeks by the injection of such repeated doses protect it from the effects of small doses of a fresh culture of the virulent bacillus. This was proved not only upon guinea-pigs, but also upon sheep and dogs. Koplik's first article is illustrated with beautiful photographs of the real and the false diphtheria bacilli in microscopical specimens and in cultures. It contains also a very satisfactory photograph of involution forms of the diphtheria bacillus.

The pseudo-bacillus was found by Koplik in four cases, already mentioned, with inflammation of the tonsils, without the real bacillus. In two cases of lacunar tonsillar diphtheria virulent typical diphtheria bacilli persisted in the crypts, in one case for three weeks, and in the other case for two weeks. At the end of these periods the virulent bacillus gave place to a non-virulent bacillus indistinguishable morphologically from the real bacillus, but presenting the cultural characters above described of the pseudo-bacillus, this bacillus being found abundantly in exactly the same situations in which the virulent bacillus previously existed. These non-virulent bacilli persisted in the tonsillar lacunæ up to the sixth week after the onset of the illness in one case. Koplik suggests the possibility that under the influence of the lymph and leucocytes of the tonsils, the virulent bacillus was transformed into the non-virulent form. He considers, however, the relationship between these two bacilli to be still an open question, but upon the whole he seems to be of the opinion that they are distinct species. When found, the pseudo-diphtheria bacilli were abundant in the cultures. Koplik's results may be said to be confirmatory of those of Escherich.

Park found, in 20 cases diagnosticated as diphtheria, the bacilli to be virulent in all, but in three of these cases the cultures from the first colony selected, although characteristic, were not virulent, while from other colonies in the same cases they were fully so. As already stated, Park used in testing virulence forty eight hours' broth cultures injected in doses of one-quarter to one-half or even one per cent. of the body-weight of the guinea-pig—selecting, where possible, young guinea-pigs. Park, therefore, confirms the observation of Roux and Yersin as to the pos-

sible coexistence of virulent and non-virulent bacilli in the same throat. He considers that in suspicious cases one should not be content with cultures from a single colony, if this should prove not to be virulent.

In this connection it may be mentioned that Park found no definite relation between the virulence of the cultures and the severity of the case. Nor was he able in an extended research to discover a relationship between the size of the bacillus and its virulence such as has been claimed by some investigators. He states that the results of 1613 cultures in which this factor was carefully noted in relation to the severity of the case indicate that in New York the great majority of cases of diphtheria yield in cultures bacilli of medium size which are characteristic in shape and in manner of staining, and that in a moderate number the bacilli are much longer, and in about an equal number they are much shorter. Both clinical histories and animal experiments showed that as long as in shape and staining the bacilli are characteristic, nothing as regards their virulence can be judged from their size. Those bacilli, on the other hand, which are short and stain uniformly with methylene-blue usually turn out to be of the pseudo-diphtheria type which have no virulence in animals.

It has already been mentioned that Park found exceptionally in cases in which diphtheria bacilli persisted in the throat a long time after recovery from diphtheria, attenuation of virulence to a point in which the cultures, although producing local reaction, failed to kill guinea-pigs.

We have cited already the investigations of Park and Beebe upon the healthy throats of 330 persons who gave no history of direct contact with diphtheria. In 24 of these they found bacilli indistinguishable from the diphtheria bacillus except by absence of virulence, which was tested by injecting forty-eight-hour broth cultures in doses of one-half to one per cent. of their weight into half-grown guinea-pigs. In 19 of these 24 cases the bacilli were grown in broth. In all of these the bacilli formed acid by their growth in forty-eight hours, sometimes more, sometimes less acid than control cultures of virulent bacilli. In 13 the broth culture was entirely characteristic, like that of the virulent bacillus, while in 6 the culture became more or less clouded, an effect which is exceptionally produced also by the virulent bacillus. No difference was found as to the growth on blood-serum. Upon agar the growth was typical of that of the virulent bacillus in 11 cases, while from 7 the bacilli grew in a less typical manner, but always in ways seen occasionally with the virulent form. Of the guinea-pigs inoculated with cultures from 15 of the cases, in only one was there any appreciable local reaction, and this subsided within four days. A very slight degree of immunity seemed to be afforded to some of the guinea-pigs by the injection.

In 27 cases the pseudo-diphtheria bacillus, which, as well as the genuine diphtheria bacillus, has been most satisfactorily photographed in cover-

slip specimens and cultures by Park, was found presenting in general the characters described above. Park describes this bacillus as shorter and thicker and more uniform in size and staining than the virulent Loeffler bacillus. It clouded and formed alkali in bouillon in the first forty-eight hours, grew more luxuriantly on agar, and was not pathogenic. Park would confine the name pseudo-diphtheria bacillus to the bacillus or group of bacilli presenting these general characters.

Park, as well as Abbott, therefore, recognizes a non-virulent form of the diphtheria bacillus, and contends that bacilli indistinguishable from the diphtheria bacillus except by absence of virulence, should not be called pseudo-diphtheritic. He admits certain morphological and cultural variations of the true diphtheria bacillus, such as variations in size, occasional clouding of bouillon, exceptional luxuriance of growth on serum and agar, etc., but the production of acid in bouillon he regards as essential to the diagnosis of the diphtheria bacillus.

The pseudo-diphtheria bacillus, as defined above, is regarded by Park as a species distinct from the genuine diphtheria bacillus, either in its virulent or its non-virulent state. Park calls attention to the confusion introduced into the discussions on the pseudo-diphtheria bacillus by the fact that some have given this name to bacilli indistinguishable from the diphtheria bacillus except by absence of virulence, whereas others have worked with the genuine pseudo-diphtheria bacillus, which presents cultural and morphological differences from the genuine diphtheria bacillus.

It would seem to be established, therefore, by the investigations of Abbott and Park, that a bacillus in no way distinguishable from the diphtheria bacillus except by absence of virulence exists. Although other investigators have included this non-virulent but otherwise characteristic diphtheria bacillus under the designation pseudo-diphtheria bacillus, they contend that this name is inappropriate for this bacillus, which should be considered as the genuine diphtheria bacillus, which may present all degrees of virulence down to complete harmlessness, as tested on guinea-pigs. This non-virulent bacillus has been found only in a comparatively small number of cases, these cases being chiefly without characteristic lesions of diphtheria. Occasionally the virulent and the non-virulent diphtheria bacilli are found side by side in diphtheria, and occasionally the virulent bacillus has given place to the non-virulent bacillus during or after recovery from diphtheria.

Abbott, Koplik, and Park would limit the name pseudo-diphtheria bacillus to bacilli which, although bearing resemblance to the diphtheria bacillus, differ from it not only by absence of virulence toward guinea-pigs but also by cultural characteristics.

Abbott considers that there is a group of bacteria which in this sense may be called pseudo-diphtheritic, and that they are distinct species from the diphtheria bacillus. Koplik describes with much detail a special

bacillus observed by him in six cases, which he considers to be identical with the original pseudo-diphtheria bacillus of Hoffmann, and to which he would limit the name pseudo-diphtheria bacillus. This bacillus grows on agar more luxuriantly than the genuine diphtheria bacillus, and it does not change the reaction of alkaline glucose bouillon in aërobic cultures, although it produces acid in anaërobic cultures. While not expressing a positive decision, he seems inclined to regard this bacillus as distinct in species from the genuine diphtheria bacillus.

Park has probably worked with the same bacillus, at least the same as the one described by Koplik in his first article, and he also would limit the name pseudo-diphtheria bacillus to this bacillus, or to a group of bacilli presenting these several characteristics, if, as is probable, such a group exists. He considers that this bacillus, or these bacilli, differ from the genuine diphtheria bacillus at least as much as the colon bacillus differs from the typhoid bacillus. The pseudo-diphtheria bacillus was found in only a small number of cases out of the many examined, and appeared to have nothing to do with diphtheria.

SUMMARY.—This paper is a report of the results of the bacteriological study of diphtheria in the United States up to May, 1894, so far as these results are of interest for the purposes of this Congress. The investigations were made by various men in New York, Baltimore, Boston, and Philadelphia.

Some of the more important conclusions may be summarized as follows:

1. The Health Department of New York has undertaken the bacteriological examination of all cases of suspected diphtheria in that city, unless objection is made by the attending physician or unless it is not deemed advisable to disturb the patient by such examination. The methods employed are described in detail. During the year ending May 4, 1894, cultures were made from 5611 cases of suspected diphtheria. The results have proven satisfactory, and are utilized not only for diagnosis, but also to control the supervision and isolation of the cases.

2. Of 6156 cases of suspected diphtheria in New York and Boston, $58\frac{1}{2}$ per cent. were proven bacteriologically to be true diphtheria—or, if we include only those cases in which the bacteriological examination was considered to be entirely satisfactory—of 5340 cases, $67\frac{1}{2}$ per cent. were true diphtheria. These were pseudo-membranous inflammations of the throat and air-passages uncomplicated for the most part with scarlet fever.

3. At least 80 per cent. of the cases of membranous croup in New York were diphtheria, and only 14 per cent. were shown not to be diphtheria.

4. Fifteen cases of fibrinous rhinitis and 4 cases of primary and exclusively nasal diphtheria were all due to the diphtheria bacillus.

5. Various forms of atypical diphtheria, many without membrane, and with the characters of simple catarrhal angina and follicular tonsillitis, are described.

6. Instances of unusual localizations of the diphtheria bacillus, as in the middle ear, in wounds, ulcers, abscesses, conjunctivæ, lungs, heart-valves, and the distribution of the bacilli at autopsies of human beings and of guinea-pigs dead of diphtheria, are described.

7. The various bacteria found associated with the diphtheria bacillus, the most important pathogenic forms being streptococci, staphylococci, and the diplococcus lanceolatus, are considered.

8. In general the great majority of cases of pseudo-membranous anginas in scarlet fever are due to streptococci, but where diphtheria is prevalent and opportunities are favorable for exposure to diphtheria a large proportion may be due to the diphtheria bacillus. The statistics in Baltimore and in Boston present interesting contrasts in illustration of this point. Four cases of diphtheria complicating typhoid fever are described.

9. The name pseudo-diphtheria is applied to pseudo-membranous inflammations of the throat and air-passages not caused by the diphtheria bacillus. The most important and common micro-organism in pseudo-diphtheria is the streptococcus pyogenes, but other bacteria may be the cause. The mortality in these affections is low in private practice, being 1.7 per cent. in 408 consecutive cases in New York. In hospitals it may be as high as 25 per cent. Death is generally due to some complication, the most important complications being scarlet fever, membranous laryngitis, and broncho-pneumonia. The disease seems to be only slightly, if at all, contagious. For this reason, and on account of the low mortality in uncomplicated cases, those cases which are proved bacteriologically not to be true diphtheria are not kept under supervision by the Health Department in New York. Until such proof suspicious cases are treated as diphtheria.

10. Of 752 cases of diphtheria in New York, the diphtheria bacilli in 325 disappeared within three days after the complete disappearance of the exudate. In 427 cases the bacilli persisted for a longer time, viz., in 201, for from five to seven days; in 84, for twelve days; in 69, for fifteen days; in 57, for three weeks; in 11, for four weeks; and in 5, for five weeks. In one case, virulent bacilli were found seven weeks after disappearance of the exudate. The cases are kept under supervision until the bacilli have disappeared. Sometimes they disappear first from the nose; at other times, first from the throat.

11. In fourteen families, with forty-eight children, where little or no isolation of a case of diphtheria in each family was undertaken, virulent

diphtheria bacilli were found in 50 per cent. of the children, of whom 40 per cent. later developed diphtheria. The bacilli were found in less than 10 per cent. of the children in families where the case of diphtheria was well isolated.

Antiseptic irrigation and cleansing treatment of the throat lessens the liability of those thus exposed to develop diphtheria.

All members of an infected household should be regarded as under suspicion, and where isolation is not enforced the healthy as well as the sick should be prevented from mingling with others until cultures or sufficient lapse of time give the presumption that they are not carriers of contagion.

12. Diphtheria bacilli may be present and multiply in the throat without causing symptoms or lesions. They must find susceptibility to their pathogenic action in order to cause diphtheria.

13. In three hundred and thirty persons who gave no history of direct contact with diphtheria, virulent diphtheria bacilli were found in eight, of whom only two subsequently developed diphtheria. Bacilli, indistinguishable morphologically or in cultures from the diphtheria bacillus, including the formation of acid in forty-eight hours in bouillon, but entirely devoid of virulence, were found in twenty-four of these persons, in most of these instances in large numbers. The pseudo-diphtheria bacillus was found in twenty-seven.

14. Instances are given in which the diphtheria bacilli were found on various objects outside of the human body, viz., bed-clothing soiled with discharges of diphtheria patients; the shoes and the hair of nurses in attendance on diphtheria patients, and a brush used in sweeping the floor of a diphtheria ward.

15. Some of the various ways in which the diphtheria germ is transported are summarized.

16. A bacillus in no way distinguishable in morphology or in cultures, including the formation of acid in bouillon, from the usual diphtheria bacillus, but devoid of virulence, exists. The virulence was tested by injecting into half-grown guinea-pigs $\frac{1}{2}$ to 1 per cent. of their weight of forty-eight-hour bouillon cultures. This bacillus, although it has been called by some investigators the pseudo-diphtheria bacillus, should not be so designated. It is the genuine diphtheria bacillus devoid of virulence. It was met with in a comparatively small number of cases out of a large number examined. Exceptionally, it may occur together with the virulent diphtheria bacillus in diphtheria, and occasionally it takes the place of the virulent bacillus during or after recovery from diphtheria. In several instances it was found in healthy throats.

The name pseudo-diphtheria bacillus should be confined to bacilli which, although resembling the diphtheria bacillus, differ from it not only by absence of virulence, but also by cultural peculiarities, the most

important of the latter being greater luxuriance of growth on agar and the preservation of the alkaline reaction of bouillon cultures. The pseudo-diphtheria bacillus may render bouillon cultures acid in forty-eight hours when grown anaërobically. The pseudo-diphtheria bacillus in this sense was found in a number of cases, but not frequently. It is probably of different species from the genuine diphtheria bacillus, and is without diagnostic importance.

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REVIEWS.

A PRACTICAL TREATISE ON MEDICAL DIAGNOSIS FOR STUDENTS AND PHYSICIANS. BY JOHN H. MUSSER, M.D., Assistant Professor of Clinical Medicine in the University of Pennsylvania; Physician to the Philadelphia and the Presbyterian Hospitals; Consulting Physician to the Woman's Hospital of Philadelphia and to the West Philadelphia Hospital for Women; Fellow of the College of Physicians of Philadelphia; Member of the Association of American Physicians; President of the Pathological Society of Philadelphia, etc. Illustrated with 162 woodcuts and 2 colored plates. Philadelphia: Lea Brothers & Co., 1894.

WE expect to find nowadays a book written by an American physician of standing, at once of good literary quality, containing the best of what is to be found in the writings of others as well as the results of his own investigations and experience, and, above all, eminently practical. Such a book is the *Medical Diagnosis* of Musser.

It is well planned and well written. The language is clear, explicit, terse. Some of his descriptions are most excellent, and paint as vividly as words can, the picture of disease. As instances, we may mention the description of the actions of the healthy baby as compared with those of the rickety child or the sufferer from meningitis (p. 58); the description of the typhoid state (p. 107), and of internal hemorrhage (p. 177). He seems to have taken special pains to simplify the more complex and intricate subjects. We do not remember to have seen the main facts concerning the reaction of degeneration, always a puzzle to students, more clearly and succinctly stated than in this book (p. 793).

An occasional grammatical error or misspelled word has escaped the proof-reader. "Günzburg" is spelled "Günsburg." "Ponfick" is probably meant by "Pomfret" (p. 164). And on page 646, fifth line, should not "another cubic centimetre" read "another one-tenth of a cubic centimetre"? The following is also, probably, the result of a little haste in correcting manuscript: "In the initial stage of fever, sudden rise of temperature to a high degree from a condition of apparent health is against any of the infectious diseases except scarlet fever" (p. 111). The words "infectious diseases" are probably here accidentally used for "acute specific fevers"—as our author terms the exanthemata—for he distinctly includes such diseases as pneumonia, malaria, osteomyelitis, pyæmia, among the infectious diseases, and speaks of the sudden rise of temperature that so often characterizes the onset of each.

The practical nature of the work is seen on almost every page. While fully alive to the importance of many of the newer and more recent advances in knowledge, the author is not drawn away by the attractiveness of some new but not yet fully established theory from that which is well grounded in scientific clinical experience. The book

becomes, therefore, a safe guide for students, for workers in laboratories, and for bedside practitioners. Many physicians will be pleased to note that the fact is fully recognized that modern methods of examination, chemical, microscopical, bacteriological—easy of application in a hospital with numerous assistants and with laboratory and patient near together, methods often necessary to a complete and scientific diagnosis, and without which therapy, the ultimate aim of diagnosis, is but blind empiricism—frequently demand of the physician in private practice more time than he can possibly give. "The tax on the physician is far greater than a few years ago. The bedside labor is great, and in addition he must have a laboratory at his command for microscopical, chemical, and bacteriological work. The outcome is that the scientific physician must have a *clientèle* limited in number, or else have one or more assistants to aid in his investigations. Without doubt, the latter will soon occur. Not as in days of old will we find in the practitioner's office the apprentice, compounding drugs and rolling bandages, assisting in the operation of bleeding, and dressing ulcers, but the highly-trained, scientific assistant, who by labors in the laboratory and at the bedside is competent to collect data suitable for scientific methods of reasoning" (p. 21).

The first three chapters, on "General Observations," "The Data obtained by Inquiry," and "The Data obtained by Observation" will well repay careful perusal. The cautions and advice to students and young practitioners are of extreme value, and we are sure that many of maturer years would find most useful practical hints in these pages. Too often, we fear, these introductory chapters are hastily written and more hastily read, the desire of writer and reader being as soon as possible to get at the definite and specific diagnosis of particular diseases. Part I., on "General Diagnosis," is one of the best parts of the whole work. We are tempted to make liberal quotations from this portion, *e. g.*, from what is said concerning "Method of Inquiry" (p. 30), "Subjective Symptoms" (p. 32), but content ourselves with a brief extract (p. 50): "What has been thus imperfectly said is intended to emphasize the fact that no mystery attends the recognition of the objective signs of disease. Patient training, skill in technique, and opportunities of observing disease at the bedside are essential." We are glad to see this fact so emphatically stated, for it cannot, we think, be too early taught that there is no such thing as a diagnosis by some hidden, mysterious power—an intuitive diagnosis; that the apparently intuitive diagnosis of the skilled physician has nothing magical about it—that it is but the rapid action of the brain that works quickly because in the past it has been carefully trained to interpret the phenomena observed by all the senses. The "intuitive diagnosis" is intuitive as is the ability of the pianist to read music at sight, *i. e.*, it is the result of hard, patient training.

Following "General Diagnosis," the diseases of the various systems of the body are taken up, under "Special Diagnosis." The separate diseases are, many of them, considered very briefly indeed. This brevity, however, does not indicate scanty treatment, as the methods of examination peculiar to each system of organs are fully considered before the diseases of the special organs of that system are taken up. Here are described in compact form, yet clearly stated, the aids to diagnosis derived from bacteriology, the examination of sputum, exudates, stomach

contents, the blood—due weight being attached to the examination of stained blood preparations—the urine, etc. The value of the anamnesis, and of percussion, auscultation, inspection, etc., is fully set forth. This plan enables the author to speak very briefly of each particular disease as it is considered, as the method by which certain facts concerning the anatomical or physiological changes in an organ are learned has been already described, and can be assumed as known. Perhaps the nervous system, a most difficult subject to treat of in a work of this kind, is slighted a little. Yet the main facts are given, and with admirable clearness. The frequency with which Gowers is quoted in these pages is noticeable.

We have read this work with both pleasure and profit, for there is scarcely a page but what contains some new fact or an old fact presented in a new light, or a valuable practical hint put in such a way as to be readily remembered. A few only of the many points we have noted may be mentioned here.

We are heartily in accord with what is said concerning the value of exploratory puncture as an aid to diagnosis (p. 159 *et seq.*), and are glad to see this procedure viewed as a surgical operation, and to find stress laid upon the preparation of the instruments, the hands of the operator, and the skin of the patient, even though our author is almost fastidious in his directions concerning the aseptic operation. He justly warns against the exploratory puncturing of the acute splenic tumor of such diseases as typhoid fever, because of the danger of rupture of the organ.

"I know of no affection which is more frequently overlooked during life than pericardial effusion" (p. 394). To this might perhaps be added "and small pleural effusions."

His advocacy of the subdivision of the abdomen according to Ballance, into quadrants of a circle, with the umbilicus as a centre, and diameters passing at right angles to each other, the one coinciding with the median line of the body, and the other being the transverse umbilical line (p. 467), is timely, and warranted by its simplicity of comprehension and ease of remembrance.

In gonorrhœal rheumatism "ulcerative endocarditis may supervene. There is entire absence of heart symptoms from simple endocarditis" (of gonorrhœal rheumatism) (p. 141). There are cases of gonorrhœa with so-called gonorrhœal rheumatism and acute benignant endocarditis where symptoms of cardiac affection are present. We have seen such a case in a female, where palpitation, dyspnœa, præcordial pain, rapid pulse, and cardiac murmur, gave evidence of acute valvular endocarditis, and in which two years later the diagnosis was confirmed by the presence of cardiac hypertrophy, loud mitral systolic murmur, and signs and symptoms of beginning failure of compensation.

We predict for Musser's *Medical Diagnosis* a cordial reception. The work of Jaksch, a model of its kind, deals only with microscopical and chemical examinations; Vierordt has little or nothing concerning diagnosis with the aid of the anamnesis; Musser combines the merits of both these works, together with the lucidity and practicality of Da Costa, whom he bids fair to rival.

J. B. H.

TEXT-BOOK OF ABDOMINAL SURGERY: A CLINICAL MANUAL FOR PRACTITIONERS AND STUDENTS. By SKENE KEITH, F.R.C.S. Ed.; assisted by GEORGE E. KEITH, M.B.C.M. Pp. 508. Philadelphia: The J. B. Lippincott Co., 1894.

THIS is Vol. IV. of Pentland's Medical Series, and bears the familiar impress of the excellent work done by that publisher.

In subject-matter this is a most timely book, and especially for Americans. In contrast with some recent works on gynecology, the book under discussion seems at first sombre and tame, lacking the abundant illustrations so much employed here at present. We have no picture of the authors in the act of washing their hands, and none of the public beauties of London graces the book with her nude form! However, "Good wine needs no bush"—certainly none of the sort mentioned.

Dr. Keith divides his book into two sections, the first of which treats of abdominal surgery in general, the second of abdominal surgery peculiar to women. In the matter of diagnosis he is not accustomed to use most often the dorsal posture with flexed limbs, but with extended limbs, the shoulders being low. Rectal examination seldom gives much information in his experience. In examining the urine to ascertain the patient's condition with reference to operation, he includes an estimation of the quantity of urea excreted—a rational and valuable precaution. The unenlarged spleen cannot be grasped; the kidney is to be discovered by palpation, as clearly described.

The chapter upon tapping and aspiration clearly shows the value of these procedures, which have too little place in the teaching and practice of some. The belief advanced that a patient may have acute peritonitis from catching a chill following the withdrawing of a large quantity of warm fluid by tapping is not in accord with the pathology of those who believe that acute peritonitis invariably follows the accession of an infective germ. Such writers would ascribe peritonitis following tapping to the use of an infected instrument or puncture through septic integument. The selection of the umbilicus as the site of tapping is also noteworthy. In aspiration and tapping the writer does not countenance the partial removal of fluid from cysts or from the abdomen, but urges the complete emptying of such collections. Sudden collapse from removal of intra-abdominal pressure by complete emptying of fluid, he does not mention; we have seen this prove rapidly fatal. In diagnosing malignant growths, stress is laid upon the microscopic study of the cells contained in the fluid removed; Foulis' cells are regarded as of great diagnostic significance. Exploratory operations are held to be seldom justifiable; the author would advise consultation in obscure cases, and when immediate operation is not imperative he would wait until time sufficient to clear up the diagnosis had elapsed. This plan of action, while clearly in the patient's interest, would scarcely satisfy the ambition of many abdominal surgeons who permit no diseased abdomen coming under their inspection to go unopened.

The preparation of a patient for operation, the description of a good nurse, and the details of arranging for an operation, are simply and concisely stated. In comparison, the thorough purge, shaving of the pubes, and preliminary starvation, often insisted upon, seem excessive. The

author's great dread of chilling the surface of the patient's body is exemplified in the manner in which he would wrap her in a shawl before making the incision. The author's practice in making the incision, in dealing with adhesions, in the toilet of the peritoneum, in the use of drainage, in closing the wound, dressings, and the use of antiseptics, fully includes the essentials of good abdominal surgery wherever practised.

In after-treatment, the author allows water in moderation; uses tartrate of morphia in doses from one-twelfth to one-quarter of a grain, gives castor oil or salines by the mouth, and in threatened paresis of the intestine injects quinine and whiskey, or passes the rectal tube. We miss the free use of strychnia hypodermatically so common among American operators. We also note the agreeable absence of that hysterical denunciation of morphia which has been so industriously used by extremists to attract attention to themselves and their fads. In peritonitis the author's pathology dictates treatment, as should be the case with all surgeons. Warmth, morphia and salines, local gastric treatment, are first to be tried; for rigor and collapse, immediate opening and free flushing. Here again the older pathology and experience may seem to run counter to modern teaching and practice: it is for the individual operator to study the individual case, do what he believes best, and bear the responsibility. In chronic peritonitis, usually tubercular, tapping or aspiration, with iodine and the iodides, will usually suffice. Drainage should be by rubber tubes; the gauze drain is not recommended.

Ventral hernia is rare in the author's observation, resulting from imperfect union through bad technique; the rubber drain does not cause it, others may. Abscess is treated by poultices, and incision with drainage. Complicated methods of closing an abdominal wound are unnecessary; interrupted stitches through all tissue, three to the inch, of silk, are used. After the operation a stout jean belt is worn next the skin; the belt should be kept from slipping up by fastening the stockings to it by suspenders at the sides.

Rare forms of disease of the peritoneum and the stomach are treated fully and clearly in accordance with the principles of sound surgery and ripe experience.

In diseased conditions of the intestine calling for surgical care, every effort must be made to arrive at a correct diagnosis. When such is reached and the condition requires operation, no time must be lost, but an immediate operation is imperative. The condition of the pulse in intestinal obstruction is of great importance. Obstruction in the intestine due to nervous exhaustion is a condition of great importance not always recognized, but requiring most skilful care. Should the abdomen be opened, and only such a condition be found, the intestine should not be opened, but brought to recover its tone through proper non-operative treatment. In cases of injury to the intestine operation should be promptly performed, if it is to be of service to the patient.

The author divides appendicitis, for purposes of treatment, into those cases in which rupture of the appendix has not occurred, those in which it has happened, and chronically relapsing cases. For the first, opium, castor oil, poultices, fomentations, rest in bed, and guarded diet are advised. Operation is needed so soon as symptoms of rupture occur, or when the patient has relapses. Drainage with rubber tubes is practised; aspiration of an abscess of the appendix is never permissible. The sur-

gery of the liver, kidney, and spleen, is treated of in the same clear and thorough manner which characterizes the entire book.

In the section devoted to gynecology an earnest plea is entered for careful diagnosis, and especially in conditions suggesting coeliotomy. The most significant symptom of ovarian tumor is the emaciation of the chest and arms in proportion to the rest of the body. In ovarian growths complicating pregnancy, a peculiar feeling of want of definition presented by the tumor is very significant. In ovarian tumors which suppurate, a simple chill is given as one of the causes of this complication. The prognosis of ovariectomy is given as 5 per cent. mortality at the outside. The presence of adhesions, extensive stripping up of the broad ligaments, and weakness of the heart are the conditions which weigh most against a successful result; the prognosis in suppurating ovarian tumors is favorable. In pregnancy and ovarian tumors, operation in the early months, and, if the tumor does not obstruct birth, palliation until after labor, are advised; where an ovarian tumor complicates labor, aspiration or removal is indicated.

Ovarian cysts should never be emptied except by aspiration, and then complete aspiration is imperative. The practice of removing a small portion of fluid for examination is most dangerous. In treating the pedicle after ovariectomy, the pedicle never bleeds after the use of the cautery, but the greater delicacy requisite for the successful use of the cautery makes the ligature more popular. Cysts of the broad ligament may be successfully treated by tapping.

Removal of the ovaries is not justifiable in uterine dysmenorrhœa, when the patient is simply neurotic and no actual disease can be found in the pelvis. Salpingitis may follow simple chill during menstruation, which will rarely be assented to by many. If pus be present, operation is imperative; if not, rest in bed, hot packs, counter-irritation, iodine, and hot douches are indicated. We miss here the treatment of endometritis, and consequent salpingitis, by dilating, curetting, and antiseptizing the uterus, which gives such good results in our hands. Apostoli's use of electricity has found favor and has been followed by cessation of pain at the menstrual epochs.

In the treatment of fibroid tumors of the uterus the writer's opinions are certainly entitled to full consideration. It is one thing for a man who is incompetent to perform hysterectomy to inveigh against modern gynecological surgery, and advise electricity and palliation, but quite another for one skilled in abdominal surgery to state unreservedly that all fibroids do not warrant hysterectomy, and that electricity will sometimes cure the disability caused by fibroids, while other methods of palliative treatment will avoid an operation. The grounds for the adoption of the various methods of treatment are fully stated, and the natural history of fibroids is taken as a rational basis for judgment. In performing hysterectomy, "The operation should always be begun with the intention of performing the intra-peritoneal method, and removing the whole organ if possible, but the operator must be prepared to adopt any method, should it seem best to do so when the exact conditions are found out during the progress of the operation." We quote this paragraph entire as affording the best possible summary upon the question of technique in hysterectomy. Péan's treatment of fibroids by *morcellement* does not meet with favor; vaginal and abdominal myomectomy are not mentioned. The section upon fibroids, in this book, and Lusk's paper on the subject (THE

AMERICAN JOURNAL OF THE MEDICAL SCIENCES, July, 1894), contain the best statement of our actual knowledge of this subject known to us.

Cancer of the uterus; extra-uterine pregnancy; hysterectomy for prolapse; the abdominal surgery of difficult labor, including symphysiotomy, and pelvic abscess, are next considered. In pelvic abscess drainage is advised, through the dependent part, *per vaginam*, if possible. An account of heart-clot closes the volume. We are surprised to know that of five cases in Dr. Keith's experience but two have proved fatal.

In concluding our review of this book we draw attention with pleasure to the thorough scholarship and good judgment of its author. It may be styled conservative by some, but it certainly is a safer guide than are the writings of those with more courage than conviction and more conviction than judgment. If it does not present an extensive comparison of the methods of operators outside of England, it states clearly and fairly the well-tried methods of those to whom abdominal surgery owes much. The account of illustrative cases which the volume contains is not the least valuable of its contents.

E. P. D.

LEÇONS DE THÉRAPEUTIQUE. LES AGENTS PHYSIQUES ET NATURELS. Par GEORGES HAYEM, Professeur de Clinique Médicale à la Faculté de Médecine de Paris; Médecin de l'Hôpital Saint-Antoine; Member de l'Académie de Médecine. Pp. viii., 692. Paris: G. Masson, 1894.

[LECTURES ON THERAPEUTICS. PHYSICAL AND NATURAL AGENTS. By Prof. GEORGES HAYEM, etc.]

THE third and fourth volumes of the *Lectures on Therapeutics* belonging to the series of which this is the fifth, have already been reviewed in THE JOURNAL. This section, devoted to thermal agents, covers one hundred and twenty-seven pages. Commencing with general remarks concerning their action on circulation, nervous energy, and temperature, the author takes up the effects of cold applications, which he classifies as local, distant, secondary (reactions), or late; following the same order, warm applications are discussed. Then follows a description of the various procedures, both for cold and warm applications, baths of various kinds, affusions, lotions, packs, and the variations which have figured so extensively in the literature of the past fifty years. The Scotch douche, Russian, Roman or Turkish baths are not neglected. This portion of the work closes with a well-written summary of the effects, indications, and contra-indications of this method of treatment. The matter, as here presented, is more fairly set forth, based upon a more exact physiology and with less exaggeration as to expected results than is to be found in the *ex parte* arguments of many little books which reviewers are, without knowledge of existing literature, likely to commend. This portion of the book is safe for the practitioner, who wishes to do his whole duty to his *clientèle*, to follow; and this cannot be truly said of considerable of the recent hydrotherapeutic literature.

Two hundred and eighty pages are devoted to the subject of electricity. The physics of this agent are presented well within the comprehension of the professional reader, the terms in use clearly defined, and the various apparatus fully described and illustrated. We believe,

however, that static electricity should have received more attention, and we do not find the more recent machines figured nor the recent and important improvements noted. So far as galvanism and faradism are concerned, the multiplicity of apparatus and the full descriptions leave nothing to be desired. Their number, however, suggests—that the practitioner already knows from experience—that the perfect galvanic or faradic apparatus has not yet been devised. Storage-batteries receive attention, and the statements made are discreet, ending with the observation that “in general they are furnished by the manufacturers, who keep them in order by contract.” The therapeutic results are accurately and justly set forth, and the more recent methods and theories, including the sinusoidal currents and electric cataphoresis, fully explained. We believe, however, that metallic electrolysis is omitted. Starting upon a chemical and physiological basis, electricity can accomplish certain definite and constant results; it is not a panacea, nor is it even a remedy to be used otherwise than in accurate dosage, under well-defined indications, and to accomplish accurately limited purposes. From this standpoint we believe the section is practical, sound in theory, and worthy of careful study.

Atmospheric pressure receives brief mention in thirty pages. The physiology of compressed and rarefied air, the therapeutic ends and results, are rapidly sketched. Although Bert's cabinet and Walderburg's apparatus are figured, the author is apparently unaware of the practical work that has been done in this country with the pneumatic cabinet—formerly more in use than at the present time. Climate receives due attention in seventy-four pages. Of necessity this subject is rapidly gone over; the analysis of what goes to make up the totality known as climate, the classification of stations and distinctive characteristics of various stations, are briefly stated—for a full exposition of this subject would occupy a much larger volume than this.

The remainder of the volume is devoted to mineral waters. The author has very skilfully avoided undue enthusiasm, which might readily be acquired from the highly-colored literature of the resident physicians of the various spas, and he has given the subject careful study. The classification is a practical one, and the statements regarding the properties of the various springs carefully made and presented. We would criticise this and the subject-matter of climates only in that, with a few insignificant exceptions, the health resorts and mineral springs of the Western hemisphere are entirely omitted, thus markedly limiting the usefulness of the book for American readers. A colored map showing the climatic stations, mineral springs, and bathing resorts in France and central Europe is a very important addition to the volume.

The book is well made, and mechanically leaves little to be desired. The illustrations, however, on pages 101 and 103 suggest the “living pictures” of the stage of to-day. Apostoli deserves better than to be designated as Aposoli (p. 402). Also, on page 624 the analysis of Rubinat Condal is omitted. We approve of the grouping together of these subjects in one volume; they are thus presented in truer perspective, their values more justly appear, and there is less opportunity for unwarranted enthusiasm concerning individual methods and ignoring other means for the accomplishment of definite purposes.

This is an attractive and readable book; we wish that it were accessible to the English reader. We hope the day is not far distant when

our medical students may be fortunate enough to know these subjects as thoroughly as at present they are taught the uses of drugs. When that day arrives the material on these subjects that is now placed before the medical public as alleged contributions to literature will not find a market.

R. W. W.

PAIN, PLEASURE, AND ÆSTHETICS. An Essay concerning the Psychology of Pain and Pleasure, with special reference to Æsthetics. By HENRY RUTGERS MARSHALL, M.A. London and New York: Macmillan & Co., 1894.

THIS is a work in pure psychology. It seems to be dialectical rather than scientific; to be founded upon subjective rather than objective study. This is, perhaps, the inevitable characteristic of purely psychological work: its method is largely introspective, with self-consciousness as its agent. This tends strongly to make dry reading, especially for workers in other fields of science who are accustomed to strictly objective methods, and whose labors appeal to all, or to most all, of the special senses. This subjective character is strongly marked in Mr. Marshall's book, in which there is little reference to facts of original observation, and an almost total absence of illustration from either Nature or literature. Hence the book makes unmistakably hard reading, and the profits to the ordinary reader are few. It has not been always so with the psychologist; we recall the works of Locke, of Dugald Stewart and of Sir William Hamilton, in the style of all of whom there was a vitality and an aptness of illustration which are no longer cultivated.

We consider it of the first importance that psychology should be submitted as strictly as may be to the ordinary methods of science, because it is one of the chief of the sciences, and especially because it has important relations with some of the medical sciences.

Mr. Marshall's book does not present psychology in any of its relations with the medical sciences, but in its relations with æsthetics and the art instincts. In this aspect of the book it is not our part to review it extensively here. In his analysis of pain, the author refers to the work already done in psycho-physics, but he is not inclined to adopt the view that there are special nerves and paths for pain in the nervous system. His conception, in fact, of what constitute pleasure and pain is clothed in language which does not convey to our mind a clear meaning. He is an advocate of the so-called *Quale* theory, which teaches that pleasure and pain shade into each other, and that one or other, or both, of them are qualities of all mental states. This view is opposed, we believe, by the physiological psychologists, who teach that pain at least is a distinct sensation, with its own special nerve-tracts and sense-terminals, and who adduce facts from pathology to support their claim.

The book is addressed primarily to the psychologist, and secondarily to the artist; but the latter, as Mr. Marshall says rather deprecatingly in the introduction, "at the mere mention of psychology will be apt to lay the book aside," in which opinion we agree with the author, because we believe that art impulses cannot be nourished in books of pure psychology and abstract phraseology.

J. H. L.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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THE TREATMENT OF DYSMENORRŒA.

DR. SCHWARZE speaks with emphasis against the use of narcotics. *Viburnum prunifolium*, fluid extract, in teaspoonful doses thrice daily for from five to seven days before, and continued during the menstruation, gives excellent results without unpleasant after-effects. It is not so successful if an inflammatory condition is associated with this symptom. He has noted, also, its value in arresting threatened abortion, even after the dilatation of the os uteri has been established. In many cases local massage is of great value, but it should only be employed in those which are not erotic. The use of a uterine sound before menstruation is frequently followed by relief, and of still more value is dilatation of the entire cervical and uterine canal. Electricity—galvanic current, aluminium negative pole in the uterus, large positive pole upon the abdomen, current of from fifty to sixty milliampères—has been of service in many cases. Castration is not indicated from the standpoint of the gynecologist alone, but only after consultation with the neurologist and alienist.—*Therapeutische Monatshefte*, 1894, Heft 5, S. 191.

PILOCARPINE IN ERYSIPELAS.

DR. G. WALKER BARR administers hypodermatically a dose sufficient to produce a marked physiological effect, and repeats it in two hours, a second time in six, and for the third time in two hours. One-sixth of a grain in the beginning is usually sufficient to cause salivation and sweating.—*Therapeutic Gazette*, 1894, No. 5, p. 289.

SODIUM NITRITE AS A THERAPEUTIC AGENT.

MR. GORDON SHARP prefers the sodium to the other nitrites, since it is more stable than the amyl and ethyl nitrites, and believes that the dose

should be from one to four grains; if any benefit is to be obtained it will be from the latter dose. The disagreeable symptoms—nausea, vomiting, syncope, and headache—which may arise during the administration of the drug are relieved if a primary sedative and stimulant are given: fifteen minims of aromatic spirits of ammonia, one or two minims of tincture of capsicum, five minims of a solution of morphine hydrochlorate, and chloroform water to one-half fluidounce. In angina pectoris, small doses which keep the blood-vessels in a slight state of relaxation give the best results. Large doses may so much reduce the blood-pressure that the heart, already weak, is unable to accommodate itself to the suddenly altered conditions, and syncope may take place. In irregular heart action relief follows in many cases. The explanation may be that some poison circulating in the blood causes a contraction of the bloodvessels of the periphery. Theoretically, paroxysmal bronchitic asthma should be benefited, yet so far as the evidence in six cases goes, this is not the case. In neurotic asthma the remedy failed, and in subacute bronchitis it is difficult to say if the drug had any effect. Graves' disease appears to be aggravated by it.—*Practitioner*, 1894, No. 311, p. 345.

LOCAL APPLICATIONS OF GUAIACOL.

M. FERRAND reports at the *Société Médicale des Hôpitaux* that in order to use this remedy as a local analgesic over large areas, without irritating the skin, it should have added to it an equal part of glycerin and be covered with tissue to prevent evaporation. The analgesia commences at once, and is established in a few hours; should pain return, it can be relieved by renewed applications. On the other hand, in order to obtain anti-thermic effects, it is necessary to use the drug pure or almost pure; in each case in a vehicle which can be absorbed by the skin.—*Revue de Thérapeutique Medico-Chirurgicale*, 1894, No. 10, p. 267.

THE HYPODERMATIC USE OF MERCURIALS IN SYPHILIS.

DR. L. WOLFF, from an extensive correspondence, finds that: 1. This method of using mercurials is largely employed in the treatment of syphilis, with probably the exception of France. 2. The order of preference is for sublimate, next calomel, then the salicylate, yellow oxide, and gray oil. 3. The soluble are preferred to the insoluble preparations. 4. Calomel holds the first place as to rapidity of action and permanence of effect. 5. The duration of treatment should be determined by the complete disappearance of symptoms. 6. Serious complications may be avoided by proper care and cleanliness. 7. The hypodermatic method is established upon a firm basis. 8. With the exception mentioned above, the hypodermatic injection has to a great extent superseded the oral administration of mercurials.

DR. ORVILLE HORWITZ has made a clinical study of the hypodermatic method of administering corrosive sublimate and gray oil. He concludes that: 1. Hypodermatic medication will not abort the disease. 2. It should not be employed as a routine method. 3. The production of abscesses and pyalism must be rare. 4. Injections of corrosive sublimate give rise to trifling pain, but not to callosities. 5. The gray oil gives rise to slight pain and always produces induration. 6. The gray oil is more dangerous than

corrosive sublimate. 7. In suitable cases, when properly employed, these remedies are among the strongest weapons wherewith to fight the disease. 8. One-quarter of a grain of corrosive sublimate should be administered in each injection; if mercurials have already been employed, one-sixth of a grain. 9. Corrosive sublimate is of undoubted value in lesions of the face, and when a rapid impression is desired; likewise when important structures, as the brain or eye, are attacked. The hypodermatic treatment is a substitute for inunction, of advantage when time is an object; in relapsing syphilis; in disease of the nervous system; in rebellious eruptions. 10. The gray oil should be employed in severe secondary syphilis when there is evidence of a tendency to relapse; in nervous syphilis it is far superior to inunctions. 11. This treatment is the most reliable and active that can be employed.—*The Therapeutic Gazette*, 1894, No. 5, p. 309.

ANÆSTHESIA BY ETHYL BROMIDE.

DR. CH. ELOY carefully reviews this subject. Anæsthesia takes place in two stages: the first partial—consciousness is not lost; the second, consciousness is lost. It is an anæsthetic at once powerful and rapid. It cannot be employed for long operations nor when there is likely to be a great loss of blood, for the drug will increase it. Clinically it is contra-indicated in pulmonary tuberculosis, acute or chronic bronchitis, pulmonary emphysema, cardiac affections, severe anæmia, hysteria, and alcoholism. It is employed in the same way as is chloroform. It is the anæsthetic of choice for short operations, but it cannot replace chloroform. If used with chloroform (mixed anæsthesia), it shortens the pre-anæsthetic stage, and is the method of choice in large operations.—*Journal des Praticiens*, 1894, No. 35, p. 412.

[When this anæsthetic was employed in this country, some fourteen years ago, it was found to be dangerous, even causing death, so that its use was abandoned.—R. W. W.]

THE PHYSIOLOGICAL ACTIONS OF ALCOHOL.

DR. DAVID CERNA concludes a most interesting paper as follows: 1. Alcohol in small amounts excites and in large doses depresses both the peripheral motor and sensory nerves. 2. Excessive quantities cause a spiral degeneration of the axis cylinder of nerve fibres. 3. Reflex action is at first increased and afterward diminished by an influence exerted upon the spinal cord and the nerves. 4. In small amounts the drug stimulates the cerebral functions; it afterward, especially in large quantities, depresses and finally abolishes them. 5. Alcohol causes a lack of co-ordination by depressing both the brain and spinal cord. 6. In toxic doses alcohol produces hyperæmia of both brain and spinal cord, especially of the lumbar enlargement of the latter. 7. Small doses of alcohol produce increased rapidity of the heart-beat; large amounts, a depression of the same. In either case the effect is brought about mainly through a direct cardiac action. 8. The drug in small quantities causes a rise of the arterial pressure by a direct action upon the heart; in large amounts it depresses the arterial pressure similarly through a cardiac influence. 9. In large doses alcohol enhances coagulation of the blood; in toxic quantities it destroys the ozonizing power of this fluid, causing a sepa-

ration of the hæmoglobin from the corpuscles. 10. Alcohol in small doses has little or no effect upon the respiratory functions; in large amounts it produces a depression of both rate and depth of the respiration through a direct action upon the centres in the medulla oblongata. 11. The drug kills by failure of the respiration. 12. On the elimination of carbon dioxide alcohol exercises a varying action, sometimes increasing, sometimes decreasing such elimination. 13. The action of alcohol on the amount of oxygen absorbed also varies, and may be said to be practically unknown. 14. The drug lessens the excretion of tissue-waste, both in health and disease. 15. In small amounts alcohol increases bodily temperature; in large doses it diminishes the same. The fall of bodily temperature is mainly due to an excess of heat-dissipation caused by the drug. 16. Alcohol, in sufficiently large amounts, has a decided antipyretic action. 17. In moderate amounts alcohol aids the digestive processes. 18. Alcohol diminishes the absorption of fats. 19. The drug exercises a varying influence on the amount of urine secreted, but it probably increases the activity of the kidneys. 20. In large doses, or when continuously used for a long time, alcohol produces cirrhotic changes, especially of hepatic tissue, and paralysis of spinal origin. It also causes insanity, epilepsy, and other maladies. 21. Alcohol is mainly burnt up in the system, when taken in moderate quantities, but when ingested in excessive amounts it is partly eliminated by the breath, the kidneys, and the intestines. 22. Alcohol is a conservator of tissue, a generator of vital force and may, therefore, be considered as a food.—*Therapeutic Gazette*, 1894, No. 6, p. 371.

THE GLYCERO-PHOSPHATES.

M. A. ROBIN has been led to use these remedies because, in his studies upon neurasthenia, he had noted that certain patients eliminated in the urine considerable quantities of incompletely oxidized phosphorus, indicating an exaggerated denutrition of the nervous lecithin. It is well known that the greater portion of the unoxidized phosphorus is found in the urine as phosphoric acid, and that this is one of the constituents of lecithin. Since, then the elimination of medicinal phosphates is accomplished with great difficulty, it is believed that phosphorus is furnished to the organism in an organic combination which approaches that which obtains in the nervous system. Marvellous results are obtained, and these especially upon the apparatus of innervation. The calcium, sodium, and potassium glycono-phosphates are used, either singly or combined, administered by the mouth or subcutaneously. The lime salt in a four-grain dose given subcutaneously will increase the urea, the chlorides, sulphates, lime, magnesium and potassium, the coefficients of nitrogen and sulphur oxidation. It does not appear to have a marked influence upon the uric acid, and only causes slight variations in the amount of incompletely oxidized phosphorus, which it tends rather to diminish. It has a powerful influence in accelerating nutrition, and this acceleration has its source in the especial stimulation of the nervous apparatus. In this respect its action is entirely antagonistic to that of antipyrine, which is the remedy for exaggerated nervous excitability, as the glycono-phosphates are indicated for nervous depression. They have been successful in the convalescence from epidemic influenza and infectious diseases, the nervous asthenia

of various origins, in a particular variety of neurasthenia dependent upon a loss in the urine of incompletely oxidized phosphorus, in sluggish chlorosis, when the nitrogen is incompletely oxidized in the phosphaturic albuminurias, and in phosphaturia. In conclusion: 1. The glycono-phosphates are powerful therapeutic agents which accelerate general nutrition through their action upon the nervous system. 2. The essential indication for their use is nervous depression. 3. In subcutaneous injection they produce at least as energetic effects as the testicular liquid, which probably acts only by virtue of the organic phosphate which it contains. There are advantages in using these in place of the liquid, in that definite products of regulated dosage are substituted for an uncertain preparation, which is variable and eminently unstable. 4. The observations above cited give the hope that these injections will be useful in the treatment of nervous asthenia from various causes, of phosphaturic albuminurias, of phosphaturias, of Addison's disease, of some sciaticas, and tic douloureux of the face. In locomotor ataxia the results are more uncertain, but appear to tend toward a diminution of the lightning pains.—*Les Nouveaux Remèdes*, 1894, No. 9, p. 203.

LEGUMIN FOR INTOLERANCE OF MILK DIET.

DR. BORET, recognizing the very great usefulness of a milk diet in various conditions, believes that, owing to its contained lactic acid, it possesses a microbicidal power; it has been demonstrated that this acid is a bad soil for the growth of the bacillus coli communis. Certain individuals, however, are as intolerant of milk as others are of wine or alcohol. Some have a repugnance which can be overcome, others have an incompatibility due to their pathological condition. Even if the digestibility of milk is established in a certain case, inappetence or even disgust may render this treatment unavailing. Sometimes an actual indigestion can be remedied by the addition of alkalies, as sodium bicarbonate or phosphate, or the administration of vegetable or mineral acids before or after the meal. Even under these conditions the milk may not be borne, and then it becomes necessary to resort to some of the mixed natural diastases, of which legumin is the best type. Four cases are cited where this substance was used in daily dosage of one and one-half ounces. Even six ounces can be dissolved in a quart of milk. Legumin is certainly a eupeptic, and at the same time it is a food, because of the albuminoids and phosphates which it contains.—*Bulletin général de Thérapeutique*, 1894, 20e livr., p. 466.

ANTISPASMIN.

DR. S. RABOW states that this drug consists of a union of one molecule of sodium narceïne with three of sodium salicylate, $C_{23}H_{26}NO_8Na + 3 C_6H_4(OH).CO_2Na$. It occurs as a whitish, slightly hygroscopic powder of an alkaline reaction, easily soluble in water, giving a pale-yellow solution. It contains about 50 per cent. of narceïne. Narceïne is contained in opium in from 0.1 to 0.4 per cent., and was shown by Bernard to have a purely hypnotic action and to be only slightly poisonous. The remedy has been found to possess decided hypnotic properties and to be a sedative in painful affections, particularly in those where spasm is associated with pain. In whooping-

cough, in from one-sixth to one and one-half grain doses good results have been obtained. For adults, three to seven grains; generally the smaller quantity is sufficient for obtaining the hypnotic effects. It may be administered in brandy, peppermint water, glycerin, or bitter-almond water, or, if desired, hypodermatically. It appears to rapidly lose its effect when administered to adults. In general it may be said to possess the properties of morphine, but in less degree, it being forty to fifty times weaker. In children's practice it may be useful, since no unpleasant after-effects have been noted.—*Therapeutische Monatshefte*, 1894, Heft 5, S. 217.

THE DANGERS OF CHLORALOSE.

M. TOUVENAIN reports two cases: 1. A diabetic received at night about three and one-half grains; he immediately slept, but awakened in two hours for urination. He was as if intoxicated, dull, and moved with difficulty. Fifteen minutes afterward he took the same dose. About 3 o'clock in the morning he awoke, the prey of terrifying malaise, general trembling, deafness, incoherent language, nausea, deglutition impossible, and later marked dilatation of the pupils, pulse feeble and slow, involuntary evacuation of bladder and bowels. Clysters of black coffee, ether, sinapisms, and stimulating frictions were rendered necessary to combat his symptoms. 2. The insomnia and pain caused by a uterine fibroma was treated by the same amount of chloralose as above stated, taken in two doses. Precisely the same symptoms supervened, and in addition vomiting. It is noteworthy that the dose given in these cases did not exceed the mean dose recommended by the authors who have extolled the remedy.—*Revue de Thérapeutique Médico-Chirurgicale*, 1894, No. 11, p. 296.

INTERNAL MUCOUS MEMBRANE MASSAGE.

DR. CARL LAKER believes that the result of direct massage is not only upon the cells themselves but as well upon the deeper layers of the tissues. Through the vibration of the separate tissue elements is brought about a regeneration, and this goes on to a complete new-building of the mucous membrane. Obvious results are those obtained on palpation and rhino- and laryngoscopic examinations, as shown by changed color, volume, and consistence of the tissues. For this method of treatment the hand is superior to all instruments, no matter how well constructed. To the objection that it is tiresome to the physician, it is stated that as many as thirty separate sittings can be given in the course of the afternoon without fatigue. This method is useful in hypertrophic nasal catarrh, especially in cases where reflex symptoms are noted, asthma, neuralgia, and headache. After this treatment relapses are less frequent, and, when they occur, are more readily controlled. In acute middle-ear disease, not only to open the Eustachian tubes but to keep them open, massage has proved itself an excellent remedy. In general, this method of treatment should be carried out as far as is possible in the various diseases of the upper air-passages, and it will frequently succeed in producing improvement and even cure when other methods, even in practised hands, have failed.—*Wiener medizinische Presse*, 1894, No. 24, S. 926.

MEDICINE.

UNDER THE CHARGE OF

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A CASE OF PROBABLE HEREDITARY LEAD-PALSY.

ANKER (*Berliner klin. Wochenschrift*, 1894, No. 25, p. 577) has reported the case of a girl, eight years old, who for a year had presented progressive weakness, followed by palsy of both lower extremities. The father of the child had been a compositor for seventeen years, and had at various times suffered with lead-colic; syphilis was denied. The mother had had three abortions. At the age of three years the child had fallen and struck the back of its head; consciousness was lost for five minutes, and vomiting followed. From this time the intelligence was noticed to fail. The child presented a demented look; she could not give her name and age, and could not do simple things that she was told to do. The head was dolichocephalic, and the muscles of the face presented fibrillary twitching, particularly upon the left side. The appearance was anæmic. The feet were in a position of equino-varus. There was some stiffness in the knee-joints, and the knee-jerks were exaggerated; patellar clonus could be elicited. The response of the Achilles tendon was preserved, but not exaggerated. Of the extensors of the right foot and the toes, only the tibialis anticus and the extensor hallucis longus were slightly active; while plantar flexion of the foot and toes was preserved. The toes of the left foot could only be slightly extended, but the tibialis anticus could be actively contracted; abduction of the foot was entirely wanting and plantar flexion was normal. The plantar reflexes could be elicited only to a degree permitted by active movement. The muscles in the distribution of the peroneal nerves presented partial reaction of degeneration. The mental condition of the child excluded a satisfactory study of sensibility, although simple touch and pin-point appeared to be perceived. The tendon reflexes were exaggerated in the upper extremities. The mobility of the arms was normal. Speech was somewhat nasal. The ocular movements were preserved, and the pupils reacted normally; ophthalmoscopic examination disclosed no lesion. The teeth were in good condition; the gums presented no blue line. There was evidence of weakness of the vesical sphincter. Spontaneous pain in the extremities had not been noted. In the course of the

succeeding six months the palsy also invaded the upper extremities. The hands assumed the position characteristic of radial palsy, hanging in a flexed position; extension was impossible. The thumb was flexed and adducted; abduction and hyperextension were wanting. The triceps was intact; the supinator longus contracted in flexion of the forearm. Muscular irritability was preserved, although tardy, in the extensors of the hand. Reaction of degeneration was present in the extensor communis digitorum, extensor carpi ulnaris, extensor carpi radialis longior, extensor ossis metacarpi pollicis, extensor secundi internodii pollicis, and extensor primi internodii pollicis. The interossei were parætic; the first was paralyzed, and presented reaction of degeneration. The muscles of the thenar eminence presented a similar condition. The palsied muscles were greatly atrophied. The lower extremities now hung in a relaxed condition. The function of the tibialis anticus, as well as plantar flexion of the toes, was entirely lost. The knee-jerks and the response of the Achilles tendon were preserved. After the lapse of an additional four months the paralysis of the right hand had somewhat receded; extension of the proximal phalanges was normal; the hand could be extended at the wrist, and the forearm flexed at the elbow; abduction and adduction of the fingers were preserved. In the left upper extremity the radial distribution was free, although a typical claw-hand was present; the paralysis of the interossei was, however, not complete; the opponens pollicis performed its functions normally. The peroneal palsy was unchanged; plantar flexion was preserved. The paralyzed muscles presented reaction of degeneration. Careful examination of the urine failed to disclose any abnormality. At first it was thought that there existed specific cerebro-spinal disease, but subsequently the peculiar involvement of the muscles supplied by the radial nerves, and the escape of the triceps and the supinators, suggested a plumbic origin, and inquiry revealed the fact that the father had been a compositor for many years. Direct intoxication with lead, however, did not seem possible, as the man did no work at home; and the conclusion is reached that the case is probably one of an hereditary form of lead-palsy. The condition had to be diagnosticated from peripheral neuritis, poliomyelitis, and amyotrophic lateral sclerosis.

BULBAR PALSY AND MOTOR APHASIA IN THE SEQUENCE OF INFLUENZA.

STEMBO (*St. Petersburger medicinische Wochenschrift*, 1894, No. 19, pp. 171, 172) reports two cases that aptly illustrate the multiformity of the complications of influenza, and particularly those involving the nervous system. In the one case speech became difficult, fluids taken into the mouth returned through the nostrils, saliva accumulated in the mouth, and there was dysphagia. Movements of the lips were interfered with, and the enunciation of the labials was imperfect. The tongue when protruded was tremulous, appeared small, and presented longitudinal furrows. The linguals were enunciated indistinctly. The uvula was deflected to the right. The constrictor of the pharynx was parætic, so that deglutition was difficult. The posterior crico-arytenoid muscle of the left side was paralyzed, and the corresponding vocal band assumed the median position. The voice was hoarse and nasal. The electric irritability of the muscles generally was normal; that of the

affected muscles was diminished; in these also the muscular irritability was heightened.

The second case was observed in conjunction with KOHAN, and occurred in a woman in the eighth month of pregnancy. Some time after an attack of influenza, weakness was noted in the right upper extremity, with inability to speak, although the patient heard and understood what was said to her. The face was distorted, the mouth being drawn to the left. The protruded tongue deviated to the right and the uvula to the left. The voice was hoarse, and on laryngological examination an ulcer was found in the inter-arytenoid space, together with paralysis of the left vocal band. Sensibility was obtunded on the right side of the face and in the right upper extremity, but elsewhere was normal. The tendon reflexes were somewhat increased, the cutaneous reflexes normal. The heart-sounds were normal. The patient at first could not write nor repeat what was said to her, but understood written and printed language. By and by the power of speech gradually returned, and the motor symptoms likewise improved.

In the first case the bulbar lesion is presumed to have been due to an influence of the toxins engendered in the course of influenza, while in the second it is surmised that a hemorrhage took place into the lower portion of the ascending frontal convolution, while the laryngeal symptoms are ascribed to the local lesion.

AN EPIDEMIC OF MILIARIA.

SCHAEFFER (*Wiener med. Blätter*, 1893, No. 32; *Provincial Med. Journ.*, vol. xiii., No. 146, p. 101) reports the occurrence of an epidemic of miliaria occurring in an Austrian province in the spring of the year, and lasting for nearly three months. Of the 5079 persons forming the total population of the district, 159 were attacked as follows: 17 men, 14 women, 128 children; though there is reason to believe that many mild cases escaped observation and notification. As a rule, premonitory symptoms, such as a sense of heaviness in the head, giddiness, and very considerable injection of the conjunctivæ, lasting for one or two days, preceded the rigors and outbreak of the characteristic exanthem, the latter generally appearing first on the body and spreading afterward to the extremities, and occasionally to the head itself. It consisted of numerous distinct red spots, each having a miliary papule (never a vesicle) in the centre. The eruption faded away in the course of a few hours, to be followed by intense itching and profuse sweating, but the papules could often be seen as late as the third day. Fever was rarely present during the *stadium floritionis*, which lasted from one to three days, and was followed by furfuraceous desquamation, which was usually terminated by the eighth day. The disease seldom lasted longer than fourteen days; its period of incubation is from eight to fourteen days; the same individual may be attacked more than once. In the epidemic in question no death occurred and complications were rare, but some patients, more especially adults, were long weak on their feet and exhibited a tendency to outbreaks of profuse sweating. Neither scarlatina nor varicella affords protection against miliaria; it was, however, observed that those persons that had been attacked with boils—a complaint that had been very prevalent during the preceding winter—escaped the epidemic of miliaria.

POLYURIA IN CHRONIC PULMONARY TUBERCULOSIS.

ROBIN has carefully studied the urine in a large number of cases of chronic pulmonary tuberculosis. He concludes (*Archives générales de Médecine*, June 1894, tome clxxiii., No. 6, p. 653) that in general the quantity of urine is slightly increased during the first stages of chronic pulmonary tuberculosis; it is about normal in the second stage, and more frequently diminished in the third stage. In each stage, however, a certain number (20 per cent.) of patients depart from the rule, and exhibit polyuria more or less marked. Polyuria is relatively more frequent in young adults than in the aged. The polyuria of the first stage of phthisis may present the characteristics of phosphaturia, or there may be simply an increase of urinary water without notably heightened excretion of other constituents of normal urine. Exaggerated azoturia due to denutrition is very rare. Polyuria of the later stages of phthisis is usually related with "mixed nephritis," tuberculous nephritis, or amyloid degeneration of the kidneys. Phosphaturia and essential polyuria seem to predispose to tuberculosis. There is likewise, however, a veritable pre-tuberculous polyuria, sometimes phosphatic, sometimes simple, that appears to be associated with cases of renal congestion. It is distinguished from the other form by the rapid supervention of pulmonary tuberculosis, and appears to be the first manifestation of the struggle of the organism with the bacilli and their toxic products. Transitory or reactional polyuria or phosphaturia has a favorable prognostic significance, while if permanent the phenomena are of unfavorable import. Oliguria depends upon accidents and complications, fever, sweating, diarrhœa, etc. A milk diet should be employed in cases of oliguria. Rectal injections of hydrogen sulphide are highly beneficial.

THE DIFFERENTIAL DIAGNOSIS BETWEEN PULMONARY SYPHILIS AND PULMONARY TUBERCULOSIS.

RENDU (*Bull. Méd.*, 1894; May 20, *Internationale klin. Rundschau*, viii. Jahrg., No. 27, p. 969) at a recent clinical lecture presented a case in which the question arose as to the existence of either syphilis or tuberculosis of the lungs or of both conditions in association. The case occurred in an old woman who had long been emaciated, and was cachectic, but without fever. The symptoms present were neither well-defined nor characteristic. There was complaint of pain; of stiffness of the extremities, without noteworthy weakness or paræsthesia; of dyspnœa on exertion; and for a short time of a dry cough without expectoration. On physical examination of the lungs the respiratory and auscultatory phenomena were found normal anteriorly. Posteriorly there was found dullness on percussion over the apex of the right lung, with roughened, prolonged expiration; but elsewhere the conditions in the lungs were normal. The area of cardiac dullness was not changed; the apex-beat was normal in strength and situation. On auscultation a loud, rough, systolic murmur was heard, together with a softer and more superficial murmur. The patient, however, did not complain of any symptoms of cardiac insufficiency. The arteries were neither tortuous nor rigid. The liver was normal, and the urine contained no albumin. There was present a diffuse and characteristic syphilitic melanoderma. The nose was painful

and swollen. An iritis of two years' standing existed. There was complaint of nocturnal bone-pains and of headache. The woman gave a good family history and had herself only suffered with measles. At the age of thirty she had had a sore mouth, followed a year later by pustules that left cicatrices. For several years after this her health was poor, but subsequently her condition improved. At this time she presented symptoms of bronchial catarrh together with hæmoptysis, and also renewed symptoms of syphilis despite active anti-syphilitic medication. In a discussion of the differential diagnosis it was pointed out that against the existence of tuberculous process was the long duration of the case, the absence of expectoration (excluding a search for tubercle bacilli), of râles, and of concomitant symptoms. Although syphilis usually attacks the lower portion of the lungs, cases have been reported in which the apex has been invaded. It was further noted that syphilis and tuberculosis of the lung may occur in association, and also that tuberculosis may develop in a lung previously syphilitic. Indurating pneumonia was to be excluded by the absence of a history of an attack of acute pneumonia. It was thus probable that the pulmonary changes were syphilitic. In the absence of other etiologic factors, such as the infectious diseases and arterio-sclerosis, the same origin had also by exclusion to be ascribed to the endocardial changes. The attack of measles was not thought an adequate cause. Finally it was noted that marked improvement followed the administration of anti-syphilitic treatment, including mercury and potassium iodid.

PURULENT NECROTIC MEDIASTINITIS, WITH PERICARDITIS AND DOUBLE EMPYEMA, RESULTING FROM SUPPURATION OF A SUBMAXILLARY GLAND.

MIDDLETON (*Glasgow Medical Journal*, vol. xlii., No. 1, p. 1) has reported the case of a boy, eleven years old, who complained of pain in the front and left side of the chest. A week previously a small swelling had been observed under the lower jaw on the right side, which was supposed to have arisen from a bad tooth. A day later pain was felt in the breast, and shortly afterward a pericardial friction-sound was detected. The dyspnoea was marked, the respirations numbering 50 per minute and causing great pain. The temperature was 100.2° and the pulse 132; irregular, small, and easily compressible. The pain in the breast was described as griping, while that in the left side was stabbing in character. The recumbent posture was attended with distress; the most comfortable position was lying on the right side. The swelling below the lower jaw on the right side was of considerable size, extending quite down to the level of the clavicle, and was fluctuant, red and inflamed-looking. Continuous with this swelling in the neck there was marked œdematous swelling over the upper part of the thorax on both sides of the middle line, with dulness on percussion. Over this area an emphysematous crackle was on one occasion made out on pressure. Pericardial friction-sounds were made out all over the præcordial area, and in the left lateral region and back pleural friction-sounds were also heard. The temperature rose to 103° and the boy became delirious; the pulse varied from 132 to 158 and the breathing from 42 to 50 in the minute. The aspect became ashy-gray and the finger-tips livid. The dulness on percussion over

the lungs extended rapidly and the pericardial friction-sounds persisted. The condition grew progressively worse, and death ensued. When the soft tissues were reflected from the front of the neck and chest they were observed to be markedly œdematous; but there was no subcutaneous emphysema. The tissues lying in front of the trachea were thickened, opaque, and vascular, as if from the near presence of inflammatory change, and in cutting into the region of the right submaxillary gland a foul-smelling abscess was opened. Both pleural cavities contained from six to ten ounces of fetid pus, and the loose connective tissue of the mediastinum, from the suprasternal notch to the diaphragm, was infiltrated with pus and practically in a condition of slough. This sloughy condition was abundantly present on the external surface of the anterior layer of the pericardium; but the pus-infiltrated tissue could with tolerable ease be separated from the underlying pericardium. On opening the pericardium a very recent and very moderate generalized pericarditis was disclosed, sufficient to cause only a slight roughening of the surface. The right pleura presented old connective-tissue adhesions infiltrated with purulent matter. On dissecting the structures in front of the trachea a direct channel of communication was found between the submaxillary abscess and the mediastinum. No roughness or other evidence of disease of the lower jaw could be detected. The mucous membrane of the larynx and trachea was congested and covered with blood-stained mucus.

SURGERY.

UNDER THE CHARGE OF

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THE PRESENT POSITION OF THE OPERATION OF CASTRATION FOR HYPERTROPHY OF THE PROSTATE.

J. WILLIAM WHITE, in an address before the American Association of Genito-urinary Surgeons, gave a summary of the history and present position of the operation of castration for hypertrophy of the prostate (*Medical News*, 1894, vol. lxiv., No. 22). Dr. White instituted experiments on dogs in connection with this subject in December, 1892. In an address, given by invitation, before the American Surgical Association, on "The Surgery of the Hypertrophied Prostate," at its meeting held at Buffalo, N. Y., June 1, 1893, the results of these experiments were given, and the statement that castration might cause the hypertrophied prostate to diminish in size was advanced.

The results of the experiments in detail and the line of thought which led to these conclusions will be found in full in the *Annals of Surgery* for August, 1893, an abstract of which appeared in THE JOURNAL, 1893, vol. cvi. p. 723.

Considerable discussion in the current literature followed the publication of this article, and the following operators have reported cases: Ramm, of Christiania, reports two cases practically cured after this operation; Haynes, of Los Angeles, California, reports three cases, the first is said to be practically cured, the second much improved, and the third had been operated upon too recently to record the result; Smith, of St. Augustine, Florida, operated upon "an apparently hopeless case of hypertrophied prostate with marked sepsis, cystitis, beginning uræmia," etc. "The patient fifteen weeks after the operation had gained forty-five pounds, and had no symptoms of cystitis or other urinary trouble. He urinated freely and normally."

In January, 1894, the author operated on a medical man, aged sixty-nine years, whose prostate was about half the size of an orange, who had passed no urine except by the catheter for years, whose urine was loaded with mucus, was offensive, and at short intervals was profusely mixed with blood. Fourteen weeks later, rectal examination showed a reduction in the size of the prostate to about the normal dimensions. He had not urinated spontaneously, but while before the operation it was necessary to introduce the catheter nine and one-half inches before reaching the bladder, at the time of making the report urine began to flow when the catheter had been passed but eight inches. Furthermore, its introduction is easy and painless, instead of difficult and very painful, as it was before the operation. The urine is normal in appearance, odor, and all other respects, and no blood has appeared for two months.

INTUBATION AND TRACHEOTOMY.

VON RAUKE (*Münch. med. Wochenschr.*, 1893, No. 44; *Centralbl. für Chir.*, 1894, No. 6) has summarized the statistics of about 2500 cases of intubation that have been reported in hospital and private practice. The comparison of the results from tracheotomy and intubation in the first years of life give in the first two years better results from intubation than from tracheotomy. The proportions are, in the first year, 13.9 per cent. of recoveries by intubation, to 5.4 per cent. by tracheotomy. In the second year, 32.3 per cent. by intubation, to 25.4 per cent. by tracheotomy. There were also more intubations than tracheotomies. The author believes that the O'Dwyer tubes have proved themselves to be the best means for the purpose.

A NEW METHOD FOR THE RADICAL TREATMENT OF FEMORAL HERNIÆ.

FABRICIUS (*Centralbl. für Chir.*, 1894, No. 6) describes the following operation. An incision four to five inches long is made from the insertion of Poupart's ligament parallel to it, down through the superficial fascia, exposing the superficial epigastric vein. If the hernia passes under the lesser falciform process the sac may now be seen; if, however, it has passed beneath the superficial layer of the fascia lata, that must be cut before it is exposed. The hernia should now be reduced, the sac ligated and removed, and the stump returned into the abdomen. If the constriction is too great, Poupart's

ligament should be divided at its insertion on the inner edge of the horizontal ramus of the pubes, or, where it is possible, on Cooper's ligament. This relaxation of the ligament also permits the full exploration of the hernial canal and the removal of any lymphatic glands or tissue it may contain, and makes possible the suturing as described later.

After the crural sheath has been freed, with the contained vessels, it should be displaced outwardly over the ilio-pectineal eminence, where they should be held by a blunt hook, while Poupart's ligament is sutured to the horizontal ramus of the pubes. A sharply curved needle should be used, and the stitch should take in about three-eighths of an inch of tissue above Poupart's ligament, the horizontal portion of the pectineal fascia, the primary fascicles of the pectineal muscle and the periosteum. In inserting the first stitch next to the large vessels, care should be taken to avoid the inferior epigastric artery and vein. The ligament should be sutured from that point to the pubic spine, uniting it again to the inner border of the horizontal ramus. Care must be taken in all cases to include the periosteum. The superficial portion of the fascia lata may or may not be sutured to the pectineal fascia. To prevent inguinal hernia, the pillars of the external ring should be sutured. There is no danger of obstructing the circulation by the displacement of the artery and vein, though there may be slight œdema at first.

RESECTION OF THE CÆCUM.

SENDER reports a case of resection of the cæcum, and makes the following brief observations (*Münchener medicinische Wochenschrift*, 1894, No. 1): Resections of the cæcum are rare, Sachs having been able to find but thirty cases. The chief indications for the operation are carcinoma and tuberculosis, and in a few instances on account of invagination. The case reported is that of a young woman of twenty-two years, who for some time had had intestinal obstruction. The trouble began suddenly, with severe pain in the right side of the abdomen, after having had a good night. The pain was so severe that she was obliged to return to bed. The pain continued for three weeks, but fever and vomiting were absent. Four weeks afterward there was a second attack, lasting three days. Two more similar attacks occurred, and finally a constant pain and swelling were noted in the region of the appendix.

Examination of the right iliac region revealed a distinct, firm, painful tumor. The diagnosis was extremely doubtful, inasmuch as there was no family or personal history bearing upon her condition, nor any pronounced symptoms which would lead to an opinion.

Incision was made over the most prominent part of the tumor. The cæcum was found adherent to the abdominal wall, and in attempting to free it the wall was torn, and fecal matter flowed out and was caught on the gauze. It was now clear that the whole cæcum had been transformed into a tumor, which involved the appendix, a portion of ileum and ascending colon, and continued, growing thinner, to the root of the mesentery. The tumor was removed by first excising the mesenteric portion, applying many ligatures, and suturing the mesentery at once. Intestinal clamps were then applied to the gut on each side of the diseased portion, and the growth, with the cæcum, appendix, and part of the ileum and ascending colon, removed. The ileum was im-

planted in the colon, as after pylorus resection, so that the size of the two divided ends were similar. A continued mucous suture was employed, then a sero-muscular suture of silk, and where necessary serous sutures. After removing the clamps the intestine filled immediately, so that the apposition was seen to be perfect. The abdominal wound was closed with three layers of sutures. Convalescence was uneventful; in the third week she left her bed, and four weeks after operation left the hospital. She has remained well, and the bowels are moved spontaneously and naturally.

The specimen proved to have been a carcinoma, beginning in the valve of Bauhin. Swollen mesenteric and inguinal glands were sought for but not discovered.

A SIMPLE METHOD OF PREVENTING PRESSURE NECROSIS IN AMPUTATION STUMPS.

BOGDANIK (*Centralbl. für Chir.*, May 26, 1894), after a continued success, reports the following method, which was suggested by the use of the method proposed by Obalinaki. After making a short anterior and a long posterior flap, or any flap can be used, he sutures the wound by a continuous suture, and then passes a drainage-tube. Having done this he raises a fold of skin over the end of the bone running in an antero-posterior direction, and passes a chromicized catgut suture through it from within outward about three-eighths of an inch above the sawn end of the bone; the needle is passed back from without inward about three-quarters of an inch away, and after the suture is firmly drawn it is tied; in this manner a long roll is formed over the end of the bone. Since he began to use this method he has never seen any pressure gangrene. There is sometimes a granulating wound surface found over the bone after removal of the skin suture.

APPENDICITIS AND ITS COMPLICATIONS.

LENNANDER (*Centralbl. für Chir.*, 1893, No. 44) reports 54 operations with 3 deaths. In 15 cases laparotomy with extirpation of the processus vermiformis was performed, in 21 cases peri- or paratyphlitic abscesses were opened. In 17 cases the appendix was removed during the period between relapses. In 1 case no vermiform appendix was found, although the cæcum could be entirely isolated. The author classifies as surgical cases: those in which are found acute diffuse peritonitis and intra-peritoneal abscesses following perforation of the appendix; all paratyphlitic cases as soon as the presence of pus is diagnosticated; also those cases in which, through slow ulceration, a perforation is produced, though the diagnosis in these cases is difficult. Medical cases he considers to be only those of appendiceal colic and all acute catarrhal processes within the appendix and that remain within it, except, perhaps, those that produce a sero-fibrinous or simple fibrinous peritonitis. In cases of chronic relapsing appendicitis, after the dangers of the operation have been detailed he would leave it to the desire of the patient, but would counsel operation if the attacks increased in frequency and severity, or if an encapsulated abscess were discovered. In regard to the technique of the operation, he advises that in all a lateral laparotomy, with the incision in the line of the motor nerves so far as possible, should be performed, in order

that subsequent herniæ may be prevented. He uses Péan's artery forceps to grasp the appendix while ligating, instead of a suture, and allows the forceps to remain when the ligation is difficult, protruding out of the wound. Physiological salt solution is used to wash out the abdomen—only a limited portion being flushed—the fluid being prevented from reaching the other portions by pressure. The excess of fluid is then drawn off by means of a glass tube, or by sponging between the separated fingers. Iodoform gauze or wick and glass drainage-tubes are used to drain and for dressings; the glass tube is emptied every three hours for the first twenty-four hours.

THE TREATMENT OF TRAUMATIC EPILEPSY.

MANTEUFFEL (*St. Petersburger med. Woch.*, 1894, No. 4) bases his remarks upon the fact that Jacksonian epilepsy arises from an anatomical lesion of a motor area. In the beginning of the attack a small group of muscles are involved, which enables the surgeon to definitely locate the lesion on the brain surface. The treatment has usually been to remove the scar tissue in the bone and scalp, but extended no further than the dissecting up of the dura mater. The author, however, advises, with Horsley, the removal of the cortex, or if no lesion is evident the centre involved. This removal has no lasting effect in destroying the function of the part, as its labor is assumed by another portion of the brain. A relapse of the disease may come from the new scar tissue produced, but it will be after some time, and a little freedom will be of great benefit to the patient. The author believes with Kocher, that the epileptic crisis is due to a variation of pressure and circulation that produces a "commotio cerebri," or microscopic traumatism of a small portion of brain-substance, whose influence radiates out over a large area. This "commotio" may be produced by alterations in pressure in the cerebro-spinal fluid, or jarring within the brain. This is possible on account of the intense irritability of the special portion of the cortex.

The author believes that increased intracranial pressure plays a large part in the causation of this form of epilepsy. He also advised the covering of bone defects by large transplanted skin-periosteum and bone flaps, and advises operation in cases where there has been no open wound or fracture of the skull, but where the localized symptoms make it evident that a previous blow has caused a contusion of the cortical cells and left a point that is easily irritated.

TREPHINING IN CEREBRAL INJURIES.

A. v. BERGMANN (*St. Petersburger med. Wochenschr.*, 1893, No. 51) divides cases in which trephining is demanded, as regards the time of operation, whether demanded primarily or secondarily. Among the primary he would include compound fractures where the brain is exposed or is apparently lacerated by bone-fragments. In these cases the indications are unquestioned, as are also those where there are present symptoms of acute compression or rupture of sinuses or veins. The author would also include cases in which foreign bodies are left in the wound. In gunshot wounds primary trephining is indicated where the bone-wound is extensive and bleeding persists. If, however, the ball remains within and there is no fever,

it should be left alone; secondary trephining is, however, generally called for. Secondary trephining is indicated by febrile reaction, abscesses, softening, and the formation of cysts and brain-scars. The author reports two cases of gunshot wounds and two cases of localized areas of softening, which he defines as a region of reddened, compressed brain-substance, in which is found a varying amount of extravasated blood. Its demarcation from the sound brain-substance is more or less sharply defined. He believes that the localization of such an area is an indication for operation.

OBSTETRICS.

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ICTERUS NEONATORUM.

SCHMIDT (*Archiv für Gynäkologie*, 1893, B. xlv., H. 2) has made icterus neonatorum the subject of a series of observations, especially studying the relationship between this disease and the time of section of the umbilical cord. 149 children were observed; of these 50 were separated from the umbilical cord at once, the remainder after some time, usually after placental separation. Of the latter 80, or 53.7 per cent., were icteric. 35 premature births were observed, and 114 at term. Of the mature births, 53 were icteric. Male children seemed more predisposed to the disease than female, the weak more than the strong. Whether, other things being equal, icterus interferes with the development of the child, is hard to decide, since it affects those already weak in preference.

In a large proportion of cases the disease appears between the first and fifth days. As to causation, several authors ascribe it to late section of the cord, whereby a greater mass of blood is thrown from the placenta into the child's circulation, and a great destruction of red blood-corpuscles and coloring matter ensues, followed by icterus. The uterine compression empties placental blood into the child's system. To test this view, 50 children were at once separated from the cord at birth, and 100 later; mostly after separation of the placenta. Of the 50, 36 became icteric, and 14 remained unaffected. Of the 100, 71 were observed, out of these, 30 were icteric and 41 remained well. The intensity of color and length of duration of the jaundice

were more marked in those early separated than in others. As a whole, those children whose cords were separated late became icteric in less number and intensity than those detached early.

PARTURITION IN A PATIENT WITH CLEFT PELVIS ACCOMPANIED BY
ECTROPIC BLADDER.

KLEIN (*Archiv für Gynäkologie*, 1894, B. xliii., H. 3) reports the case of a primigravida, twenty-nine years of age. She was found to have an ectropic bladder. On account of the extreme tenderness of the parts, chloroform narcosis was required during the vaginal examination. Owing to the lack of the pubic symphysis the patient's walk was unsteady and her legs bent outward. The exposed bladder wall was inflamed and rough. The external pelvic measurements were as follows: anterior superior spines, 36 cm.; crests, 25½ cm.; trochanters, 32 cm. Baudelocque's diameter could not be taken on account of the defect in the development of the pubic bone. The child presented by the head. After the presenting part had dilated the introitus to the size of a 5-mark piece, a bilateral incision 4.5 centimetres long was made in the perineum to facilitate extraction and prevent deep rupture. After the birth of the child these were closed. The infant was not malformed, and though a little asphyxiated was readily resuscitated. On January 20th the patient was discharged, and at this time no material change in the bladder could be seen. A plastic operation was recommended later. There seemed to be no clitoris, and the nymphæ and labia were undeveloped.

THE INFLUENCE OF ACCUMULATIONS OF UREA IN THE BLOOD OF THE
MOTHER UPON THE UTERUS AND THE FŒTUS.

FEIS (*Archiv für Gynäkologie*, 1894, B. xli., H. 1) reports the results of his investigations made on animals. He concludes:

1. That urea has no power to cause uterine contractions, that it is harmless in the body, provided its free excretion is not prevented, though after large injections of solution of urea convulsions followed.
2. Regarding its influence on the fœtus: after injecting the urea and while the mother was more or less convulsed, the uterus was rapidly opened. In each case the young were found dead. The animal was experimented on very near the normal time of birth. A chemical analysis of the fœtal tissues showed urea in excess. In the human female, where there is diminution of the amount of urine, with retention of urea and other urinary substances in the blood, it is probable that besides eclampsia being produced therefrom, the fœtus is poisoned by these materials transferred to it from the maternal blood.

THE ETIOLOGY AND OPERATIVE TREATMENT OF VULVITIS PRURIGINOSA.

SÄNGER (*Centralblatt für Gynäkologie*, 1894, No. 7), considers pruritus vulvæ to be a symptomatic indication of an inflammation of the vulvar skin and clitoris with involvement of the sensitive nerve-endings. Its causes may be grouped under the heads of endogenous and exogenous. After giving sub-classifications of the disease under the above-named heads, the author goes

on to consider the treatment of pruritus vulvæ. In most cases the parts are readily accessible to treatment and the disease is either cured or rendered easily bearable. In some obstinate cases, however, resection of the diseased parts remains as the only resource, though this has obtained very rarely.

The writer cites some cases upon whom operative treatment was used with success, and after describing the measures used, concludes:

1. That partial or total extirpation of the vulva is a thoroughly legitimate operation in chronic incurable cases of the disease, and that it ought to be practised more than it is.

2. The coincident removal of the glans clitoridis and its folds, especially in elderly women, is desirable, as its nerve-endings have already lost their specific sensibility from the disease.

3. In young women, or in cases of circumscribed disease, one can perform a partial operation.

4. In old persons and in extended disease, extirpate all the vulva and make a plastic filling of the space.

THE TECHNIQUE OF ARTIFICIAL ABORTION.

MUELLER (*Münchener medicinische Wochenschrift*, 1894, No. 4) contributes an article relative to the technique of induced artificial abortion, and narrates the case of a woman, aged forty-one years, of phthisical and rachitic history. The patient was in her fifteenth pregnancy, having had eight spontaneous labors, one child delivered by forceps, two by perforation, and three by artificial abortion or induced labor. There was some contraction of the pelvic diameters, but not enough to entirely control the case, but intense dyspnœa was present, due partly to malformation of the chest and partly to a large strumous tumor of the cervical glands (cervical goitre).

When coming under the present observation the patient was seven months advanced in gestation. After careful and thorough disinfection of the vagina, 100 grm. of pure sterilized glycerin were injected by means of a catheter and syringe. The patient complained of no special pain, and no escape of glycerin from the os was noticed. Immediately after the injection, violent and obstinate vomiting, accompanied by rigors, and diarrhœa set in. Temperature, 37.8° C.; respirations, 44. After the rigor, pains set in and the temperature rose to 40° C. The intense dyspnœa ceased toward night and the pains and temperature declined also. Later the pains reappeared, and a female child was born. Within a short time there occurred a second rise of temperature, with dyspnœa, and an examination revealed a second bag of waters which was ruptured, and a small dead male child was extracted. From this time the pulse, temperature, and respiration steadily declined to normal, the neck tumor shrinking also. After the injection of the glycerin the urine was red, showing a few blood-corpuscles, but no cylinders. The color was due to methæmoglobin and hæmatoporphyrin. No albumin was present.

In explanation of the repeated accessions of fever, the possibilities of septic infection from the catheter, chemical action of the glycerin, and reflex excitement of the heat-centre through irritation of the peripheral nerve-ends may be mentioned; but as the temperature rise kept pace with the pains, and as these all ceased with the extrusion of each fœtus, the author believes

the cause is to be sought in reflex excitation of the heat-centre through the stimulation of the uterus. The high color of the urine was probably produced by the glycerin.

SARCOMA OF THE CHORIAL VILLI.

GOTTSCHALK (*Archiv für Gynäkologie*, 1894, B. xlv., H. 1) contributes an exhaustive article relative to sarcoma of the villi of the chorion. The disease appears some weeks after an abortion, with symptoms of irregular and severe hemorrhages alternating with serous discharges. Recurrent curettage of the uterus gives no permanent relief, but reveals masses of dark-red or brown club-like bodies. These masses are tufts of altered chorion which extend deep into the muscular wall, so that the finger can easily advance through the softened wall, and a curette could easily pass through. It seems as though no musculature remained at the placental spot. Violent cough and extirpation of the uterus is of any use, early operation being necessary. Vomiting present themselves, but rarely fever. No treatment save total. Immediately after removal of the uterus the cough and vomiting cease, but may later return, and as metastatic growths are found in the brain, this second onset may be cerebral. Foci of disease may also be found in the lungs. Timely removal of the uterus may add six months of comfort to the woman's life. Examination of the uterus after section gives evidence of a very malignant, large-celled new-growth of the placental tufts, involving stroma and epithelium. This rapidly leads to metastatic foci by means of the blood-vessels, these foci agreeing with the primitive formations, and like these they consist of agglomerations of malignant tuft-masses. The diagnosis is based on the microscopic examinations of removed uterine contents. Club-shaped, tailed, or large cells, with giant nuclei that swell under chromatin, and taking the place of the cells of the normal villous stroma, indicate surely this disease. If in a suspicious case *one* of these altered tufts be found, remove the uterus at once.

INTRA- AND EXTRA-UTERINE FETATION AT FULL TERM; CÆSAREAN SECTION.

FRANKLIN (*British Medical Journal*, 1894, No. 1741) reports the case of a woman, the mother of five children, whose history was one of lingering labors. As the patient's condition showed a pronounced state of collapse, the abdomen was immediately opened, and a most interesting condition disclosed. The abdominal wall was as thin as parchment. The uterus presented, and it was noticed that the placental attachment was in the anterior wall, exactly where the incision should be made. On opening the uterus, a full-term, living male child was easily extracted, together with the placenta. After delivery the uterus and appendages were removed. Having secured the uterine stump, it was noticed that a large swelling arose from the pelvic cavity and was accompanied by a free hemorrhage.

On manipulation the tightened capsule of the supposed tumor ruptured, and a dead full-term fœtus was liberated. The child lay with the vertex in Douglas's cul-de-sac behind the stump of the amputated uterus. Great hemorrhage accompanied the delivery of the second child, the blood coming

from Douglas's cul-de-sac, the cæcum, and intestines, to which organs the placenta was attached. The patient lived about half an hour after the operation, transfusion and restoratives being tried in vain.

PÆDIATRICS.

UNDER THE CHARGE OF

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EXTREME PROLAPSE OF FEMALE URETHRA IN A CHILD.

BRYANT (*Lancet*, May 12, 1894, p. 1189) reports a case of this kind in a girl of six years. For three years preceding, at intervals of many months, the child had on four occasions suffered from genital irritation, with discharge from the vulva of blood-stained mucus; but, as these symptoms passed off after the lapse of a few days, no professional advice had been sought. The attack reported came on five days before Mr. Bryant saw her, with local genital irritation and straining, which being supposed by the mother to be connected with the bowel, was treated with home remedies. On the third day, as the symptoms had steadily increased in severity and the discharge of blood-stained mucus had become more copious, medical aid was sought, and two days later Mr. Bryant saw the case in consultation. At that time the genital organs were bathed with blood-stained mucus, and between the labia was a cherry-red, blood-oozing, projecting mass about three-quarters of an inch in diameter, and of the same elevation, with a more or less central orifice surrounded by folds of congested mucous membrane, through which a catheter was readily passed into the bladder. Under chloroform the urethra was dilated and the bladder explored by the finger, but with a negative result, and during this operation the prolapsed urethra was reduced. The case subsequently did well.

ACUTE YELLOW ATROPHY OF THE LIVER IN A CHILD.

MERKEL (*Münchener medicinische Wochenschrift*, January, 1894), records an unusual case of this disease occurring in a child of six years. The first symptoms noticed were malaise and loss of appetite, followed by jaundice, the temperature then being normal, but the pulse slightly increased in frequency. The tongue was furred, and the urine contained bile, but no albumin. The lower border of the liver could be felt two fingers' breadth below the costal margin. Eight days later the liver had considerably decreased in size, and could not be felt by palpation. The spleen, however, was enlarged. The jaundice had become intensified, and convulsions now

appeared. The temperature still remained normal, but the pulse had increased to 116. Death ensued seventeen days after onset. At the post-mortem the lungs were found œdematous, while subserous hemorrhages were numerous; the gall-bladder contained very little bile. The liver was very small, yellowish-brown in color, showing a number of red islets; there was gray degeneration of the hepatic cells, with round-cell infiltration in places. The kidneys showed swelling and gray degeneration of the renal epithelium, together with small hemorrhages into the substance. Commencing degeneration of the cardiac muscle fibres was also noted. The cause of the disease, as is usual in such cases, could not be determined.

PARASITES IN THE FECES OF CHILDREN.

PAGLIARA (*Il Policlinico*, 1894, vol. i., fasc. 1) has made some interesting observations upon the contents of the feces of infants in good health or presenting digestive disturbances. He examined seventy-four children and adults, and found only twice the trichomonas intestinalis, once in an adult and once in the course of a subacute follicular entero-colitis in a girl of ten months. The child recovered and the parasite disappeared. No pathogenic value can be attributed to these parasites, which have been found also in typhoid and cholera. Cunningham has stated that the trichomonas flourishes only in alkaline media, but the author has found it in stools of neutral or slightly acid reaction.

Amœbæ were not found in the stools of children, but only in those of adults.

Eggs of the common parasites were found to be absent in infants nourished entirely at the breast. In fifty-three cases of children fed artificially, such ova were found in forty-eight cases; eggs of the ascaris, in all; of the trichocephalus dispar in 12.5 per cent., and of the tænia solium in 2.8 per cent. Eggs of the oxyuris and of tænia nana were not found.

INDICANURIA: ITS EXISTENCE IN TUBERCULOSIS OF CHILDREN.

THE value of indicanuria as a sign of tuberculosis in children, as advanced by Hochsinger, of Vienna, in 1890, is still a question that seems worthy of further investigation. Kahane, in 1892, published the results of his studies confirmatory of Hochsinger's conclusions, and during the present year additional support has been given by the investigations of Mlle. Lioubitza Djowitch, an abstract of which was recently printed in this department (*AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, May, 1894, p. 603). On the other hand, Steffen, Voûte, and Carlo Giarre have offered results equally convincing against the diagnostic value of this sign. (See abstract of Voûte's paper, *AMERICAN JOURNAL OF THE MEDICAL SCIENCES*, July, 1893, p. 123.) Another contribution on the same side may be found in the recently published study of FAHM (*Jahrb. f. Kinderheilkunde*, 1894, Bd. xxxvii., p. 176), who contrasts the results of examinations of fifteen cases of tuberculosis of skin or bones with fourteen cases of other affections, including vulvovaginitis, endocarditis, laryngitis, otitis, etc. The method of Jaffé, which was that used by Steffen and Voûte, was employed, though Mlle. Djowitch

criticises the method as unreliable and apt to give a negative result when only small quantities of indican are present.

In the fifteen cases of tuberculosis, among the instances of single focal lesions, normal urine, or that containing but traces of indican, was found in 39.4 per cent., while in the remaining 60.6 per cent. indicanuria was well marked. Very nearly the same figures were found for the cases of multiple lesions, 38 per cent. with normal urine, and 62 per cent. with a well-marked indican reaction. This result contradicts the assertion of Kahane and Hochsinger, that indicanuria is more frequent in the cases of grave or extensive disease than in those where the tuberculosis is slight and limited in extent.

In the fourteen non-tubercular cases indicanuria existed in 40 per cent., and was absent or barely appreciable in the remaining 60 per cent. The proportion is therefore inverse to that found in the presence of tuberculosis. While these figures seem to prove that indicanuria is more frequent in tuberculosis than in other diseases, they add to the evidence against the value of this sign in the diagnosis of tubercular disease. It is to be hoped that studies on a more extensive scale may yet be undertaken to clear up this very interesting question.

TWO CASES OF BARLOW'S DISEASE.

COUITZER (*Münchener medicinische Wochenschrift*, 1894, Nos. 11 and 12) reports two cases under this heading which do not correspond entirely with the classical features of infantile scurvy as described by Barlow and Cheadle.

The first case was a girl of nine months, fed upon raw cow's milk and later upon sterilized milk. For a month the child cried much, especially when touched or taken up. The signs of rachitis were well-marked; large head with wide fontanelles; the rachitic rosary; epiphyseal swellings, and absence of teeth. The limbs were swollen, especially along the diaphyses of the bones and in the soft parts, rather than at the epiphyseal ends. The urine was turbid, reddish in color, contained albumin, hyaline casts, leucocytes, and red corpuscles in abundance. The child was put on milk and bouillon; and solution of acetate of potassium with citric acid and Tokay was ordered. Complete cure resulted in a short time.

The second case was that of a boy of eleven months, fed at first on sterilized milk, and later, toward the seventh month, with milk, soups, and *purée* of potatoes. For six weeks the child had been capricious and had cried when put upon the floor, or when the shoes and stockings were put on. Here also there were signs of mild rickets. About the lower incisor teeth, which were alone present, the mucous membrane of the gum was swollen and blue. About the position of the upper incisors, which appeared almost ready to pierce the gum, the mucous membrane was swollen and felt like a little sac. The lower limbs only were swollen and painful to the touch. The urine was very turbid, contained a high percentage of urates and some albumin. Treatment was the same as in the first case, and the cure was rapid. The author attributes the hæmaturia noticed in the first case to the same origin as the other hemorrhages so frequent in this disease. He refuses, however, to recognize Barlow's disease as allied to or identical with scorbutus, because, he

argues, the former is quite frequent; while scorbutus, on the contrary, is very rare; that subperiosteal hemorrhages are constant in Barlow's disease and exceptional in scorbutus; and, finally, that the former can be cured not only by (properly so-called) anti-scorbutic treatment, but also by any sort of tonic treatment.

These reasons seem weak, and are distinctly at variance with the teachings of English and American and most of the German observers. The appearance of the disease in the first case after the use of sterilized milk is confirmatory of the opinion advanced by Jacobi and Starr, in the discussion of Northrup's recent paper before the New York Academy of Medicine (see AMERICAN JOURNAL OF THE MEDICAL SCIENCES, May, 1894, p. 606).

DOUBLE RUPTURE OF THE URETHRA IN A BOY.

MAYET (*Revue mensuelle des Maladies de l'Enfance*, August, 1894, p. 417) records a case of this rare accident in a boy, twelve years and a half old, who, in playing in a gravel-pit, fell a distance of about thirteen feet, landing "astraddle" of an inclined ladder along which he slid to the ground. From the time of the accident no urine was passed by the urethra until his entrance into the Hôpital Trousseau, in the service of Broca, three days after the accident. The symptoms of extensive infiltration of urine were very marked, the scrotum being swollen to the size of the foetal head, its color black, and skin desquamating, with a spot of gangrene the size of a franc-piece over the median raphé. The penis was greatly swollen, and the prepuce œdematous. The infiltration also extended well down the thighs and up over the abdomen.

An incision was made in the median raphé of the scrotum and carried down to the urethra. A complete rupture was found at the level of the superior third of the anterior face of the symphysis. With some difficulty the posterior portion of the urethra was found, and a catheter passed into the bladder, from which 200 grm. of urine were drawn off. The instrument was fastened in position, the anterior extremity being introduced through the anterior portion of the urethra. Free incisions were made into the infiltrated areas, the wound in the scrotum disinfected, and a wet dressing applied. Death occurred six hours later in collapse.

At the autopsy intense pulmonary congestion was found, the other organs and the peritoneal cavity being healthy. The rupture found during life was located in the bulbous portion 5 cm. behind the root of the penis. One centimetre behind the posterior portion of the rupture was a second break, incomplete and involving only the postero-inferior face of the canal, its edges torn, and the orifice, one centimetre by five millimetres, having its greater diameter along the axis of the urethra.

This observation is interesting both because of the rarity of urethral rupture in children, and because multiple ruptures are rare even among men. In falls astraddle, the urethra is usually ruptured in but one place, the canal being pressed against one or other of the ischio-pubic branches. In the author's case the first rupture was situated over the anterior aspect of the symphysis, and must have been made by falling, not astraddle, but almost in a line parallel with the sides of the ladder. The second rupture, he thinks, occurred by the usual mechanism during the slide to the foot of the ladder.

HEREDITARY TUBERCULOSIS AND EARLY INFECTION.

INSTANCES of direct infection of the fœtus *in utero*, from a tuberculous mother, are on record, but the number is as yet small. Such observations have been made by Charrin, Merkel, Berti, Rindfleisch, Aviragnet, Jacobi, Labourand, and a few other writers. Recent literature has made several additions to the list. CNOFF (*Münchener med. Wochenschrift*, 1893, Nos. 39 and 40) records an autopsy upon a child of twelve weeks, born of tuberculous parents, which, at birth exhibited atrophy, anasarca, and jaundice. Miliary tuberculosis of both lungs, caseous peri-bronchitis, caseation of the bronchial glands, and tuberculosis of the spleen were found at the post-mortem. Two years later another infant of the same family, born apparently healthy, died athreptic in the thirty-fifth week after birth. The autopsy revealed caseation of the bronchial glands, purulent bronchitis, intestinal tuberculosis with caseation of the mesenteric glands. Another case dying at the age of sixty-three weeks, showed extensive ravages in the lungs that must have begun at a very early date. The lungs were filled with large cavities, one of which was the size of a man's fist. The bronchial glands, spleen, mesenteric glands, and intestinal mucous membrane were very extensively diseased.

Two cases recorded by GOLDSCHMIDT (*Munchener med. Wochenschrift*, 1893, No. 52) may be added, and are extremely interesting as showing the probable course of infection directly from the placenta. The first, an infant of fifteen months, whose parents were tuberculous, was received into the hospital for a cough of long duration, with advanced cachexia. Autopsy showed a tuberculosis of the lungs, of the bronchial, mediastinal, and mesenteric glands; on the lower surface of the liver, at the point of insertion of the umbilical ligament, was a nodule containing tubercle bacilli. The other organs were not diseased. In this case the author believes that the existence of a tubercle at the extremity of the ligament which enclosed the umbilical vein clearly points to infection of the fœtus by the blood of the mother, though the possibility of accidental infection after birth by way of the healing umbilicus must cast some doubt upon this view. The second case was very like this one. The child was seven months old, and the lesions found were advanced pulmonary tuberculosis, glandular involvement, tubercular ulceration of the intestine, and a tubercular focus in the liver at the insertion of the umbilical ligament. While the pulmonary disease was more advanced than that of the liver, the author thinks, in consideration of the site of the hepatic lesion, that this had been the focus of primary infection. Another case is recorded by this writer, in which extensive lesions were found in a child of five weeks, removed from the tuberculous mother within a few hours after birth, the mother dying shortly after. In this case intra-uterine infection seems most probable.

BOULLAUD (*Journal de Méd. et de Chir. prat.*, 1894, No. 21, p. 824) draws attention to a possible avenue of infection at the moment of birth. During the progress of the fetal head the external auditory canal may become filled with maternal blood, and this may very quickly become the seat of a tubercular suppurative otitis from which a generalized infection may spread to the organism. As a prophylactic measure he suggests a disinfection soon after birth of the auditory canals of infants born of tuberculous mothers.

ONSET OF SCARLATINA WITH ACUTE URTICARIA.

COULON (*La Médecine Infantile*, February 15, 1894) records the case of a delicate girl, of five years, of syphilitic parentage, who was suddenly seized with headache, high fever, delirium, and intense itching of the whole surface. The next morning there was a typical scarlatinal rash and angina. Three hours after the physician's visit the eruption had changed, being apparently replaced by an urticaria with intense itching. By evening this rash had begun to disappear, and the scarlatinal eruption became more manifest. The disease ran the course of ordinary scarlatina without albuminuria. Previous to the appearance of the urticaria there had been no change in diet and no drugs had been given.

HYGIENE AND PUBLIC HEALTH.

UNDER THE CHARGE OF

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THE "HERMITE" PROCESS.

Two years ago the London County Council offered facilities for the experimental treatment of a certain amount of sewage by electrolysis, a method proposed and patented by Mr. Webster.

In it the sewage was made to flow through channels in which were large iron plates or electrodes connected with a powerful dynamo. It was, however, essentially a chemical process, the sewage matters being more or less completely broken up by the action of compounds of the nascent oxygen and chlorine evolved at the positive pole, while the iron in solution served to fix the sulphur of the H_2S , and acted as a carrier of oxygen by alternate reduction into ferrous and reoxidation into ferric oxide.

This year the Town Council of Worthing have entertained in like manner M. HERMITE, a French chemist, who having been engaged in the production of bleaching liquids by electrolysis had applied the same methods to the conversion of sea-water into a disinfectant fluid, deodorant and germicide.

His electrolyzing apparatus consists of rows of vertical iron rods sheathed below in a meshwork of platinum wire, and between each row a circular zinc disk revolving by connection with the machinery that works the dynamo, the whole contained in a metal reservoir through which the sea-water is conducted.

The effect of the current passing from the zinc to the platinum is to break up the magnesium chloride, but this action is followed by a rearrangement of the elements and the formation of magnesium hypochlorite. The sodium

chloride is not decomposed, and some of the far less stable magnesium chloride remains unchanged. M. Hermite calculates that with a motive force of twelve-horse power he can obtain from each electrolyzer 1 kilogramme of chlorine per hour, which would be equal to 48 cubic metres in twenty-four hours of the fluid of a strength of 0.5 gramme of chlorine per litre, or of 96 cubic metres with 0.25 gramme Cl.

The fluid has no odor of chlorine, appears neutral in reaction, it bleaches litmus and vegetable colors, and destroys the odor of H_2S instantaneously, liberates iodine from potassium iodide, and raises the lower metallic oxides to the higher.

It attacks pure iron and zinc, though feebly, and soon covers the internal surfaces of tanks and pipes with a protective coating of impure magnesium oxide; but unfortunately it speedily destroys leather and India-rubber in fittings.

It is very stable when kept alone or diluted with distilled, tap, or even artificial sea-water; but rapidly loses strength when mixed with ordinary sea-water, probably through its action on the organic matters present therein for the most part in suspension.

The Commissioner of the *Lancet* added to 50 cubic centimetres of electrolyzed sea-water, or Hermite's fluid, quantities varying from 1 to 300 cubic centimetres of a one in fifty, *i. e.*, two per cent., dilution of urine containing originally 4.18 per cent. of solids, with the curious result that the residual chlorine estimated at the end of fifteen minutes was the same—viz., 0.24, or half the original 0.5 per cent.—whether the dilute urine added were 10 or 300 cubic centimetres, and the same limit was observed when culture broths or gelatins were substituted for the urine.

During the reaction there appears to be a temporary liberation of chlorine.

As to the precise nature of the active constituent of his fluid M. Hermite expresses himself in a very guarded manner, describing it as an "oxygenated compound of chlorine;" it has been looked on as magnesium hypochlorite, analogous to, though even more unstable than, the calcium hypochlorite contained in bleaching-powder; but many facts, reactions, and peculiarities exhibited in its behavior would rather point to a subsequent breaking up of a part of the magnesium hypochlorite into the hydric salt, or hypochlorous acid, as it is commonly called.

One understands, then, the loss of MgO after electrolysis, amounting to 10.5 per cent. of the whole, or to 22.5 per cent. of that present as magnesium chloride in the original sea-water, as well as the source of the precipitate of magnesium hydrate in the tanks and pipes. The hydrochlorite apparently gives up its oxygen to organic matter, leaving a solution of chlorine which acts, though more slowly and indirectly, in like manner.

This view is strengthened by the strong contrast presented by the reactions of Hermite's fluid and of a solution of calcium hypochlorite; and the almost identical behavior of a solution of hypochlorous acid obtained by passing CO_2 through a solution of bleaching-powder in water. Solution of bleaching-powder is distinctly alkaline, bleaches slowly, gives up little of its chlorine to printed and still less to clean paper; mixed with dilute urine it gives up nearly all its available chlorine, but emits a very slight odor of that gas; it loses little chlorine by dilution with common or artificial sea, fresh, or dis-

tilled water, does not blacken mercury, and yields *in vacuo* a distillate having no bleaching property.

Electrolyzed sea-water and a solution of hypochlorous acid of the same strength are neutral to litmus paper, which they bleach instantaneously; they yield up nearly all their chlorine to printed and about 30 per cent. to clean paper; half their available chlorine to dilute urine, evolving at the same time a strong smell of chlorine; the greater part of their chlorine to ordinary sea-water, but only a very small fraction to artificial salt-water, to fresh, or to distilled water; they instantly blacken mercury, and their distillates are powerful bleaching agents.

M. Hermite proposes bringing the electrolyzed water into the houses of a town, like gas and water; he thinks that if supplied only to water-closets at the rate of two gallons for each flush it would not cost for a town like Worthing more than sixpence per head, and that for a shilling a further supply might be provided for washing floors and yards, flushing gulleys or drains and disinfecting purposes generally. His arrangement is to fix in the siphon trap of each closet a wire basket or sieve in which fecal matters are arrested, exposed to the action of the electrolyzed fluid, and, as he asserts, disintegrated and destroyed—but this is not the case. The effluent might be sterile and the contents of the basket free from odor, but Dr. Ruffer found that the fluid exerted no greater disintegrating action than ordinary water; and the baskets, if not frequently removed and emptied, soon became choked. This single difficulty, if not overcome, is enough to absolutely preclude the general adoption of the system.

Another practical difficulty would be presented by the action of paper, soap-suds, fatty, starchy, and others matters contained in domestic slops in rendering the fluid inert before it had time to act on the fecal matters. These conditions and results were indeed found in one of the yards at Worthing, which M. Hermite refuses to recognize as a fair exhibition of his process, but which many would consider to represent it under the working conditions that would be met with in any ordinary town.

Dr. Ruffer found that when the fluid contained only 0.5 gramme per litre of the chlorine, the strength which M. Hermite holds to be sufficient for all practical purposes, it was very unstable, losing 90 per cent. within the first twenty-four hours. Such a strength was consequently useless, but the stability increased with the proportion of chlorine present. A liquid containing 0.75 gramme lost 34 per cent. on the first day, and one with 1 gramme only 8 per cent. But the amount or duration of the current to produce a solution of 0.75 gramme has to be double, and to obtain 1 gramme per litre has to be four times, that required to give 0.5 gramme.

Again, whatever the strength of the solution, it does not dissolve or disintegrate the solid fecal masses, the interior of which it fails to sterilize; although, until the particles are broken up, they are completely deodorized. It deodorizes and sterilizes foul fluids if it be added in something like equal volume, but in the case of town sewers this would obviously be impracticable.

In short, after a careful study of Dr. Ruffer's preliminary report and of the exhaustive chemical and bacteriological researches undertaken by the *Lancet* Commissioner, as well as an inspection of the works, the conclusion seems irresistible that M. Hermite has discovered a useful disinfectant for

certain purposes and places; but that, however interesting the laboratory experiments or even those exhibited at the show station may be, the system is but one more of the ingenious but unworkable schemes proposed by chemists which engineers cannot entertain unless perhaps in the case of single houses or establishments.

CONCURRENT INFECTION.

SINCE Hunter taught that "all morbid processes were simple" it has been generally held that the actual presence of one acute specific disease conferred for the time being some degree of protection against others. The experience acquired of late years in fever and smallpox hospitals—especially the frequency with which the attempt to treat smallpox cases within the same curtilage as scarlatina and other fevers, has been followed by the intercommunication of infection, at any rate of smallpox to the fever blocks—has shown pretty conclusively that the mathematical doctrine of probabilities is amply sufficient to explain why two or more diseases, each occurring as a rule but once in a lifetime, do not more often attack a man at one and the same time.

Many pathogenic organisms will grow together in a culture, and there is no reason why they should not in the living body.

DR. CAIGER gave, at a recent meeting of the Epidemiological Society, an interesting analysis of his own experience of four years as the Superintendent of the Stockwell Fever Hospital, and an analysis of the like cases in the other hospitals of the Asylums Board. He had seen 362 cases of two, and 17 of three such diseases running a part at least of their courses concurrently; and in 200 of these the febrile stages of two or three actually coincided. The relative priority of the diseases he calculated from the date of infection, as determined by the appearance of the eruption and the known duration of the incubation; for the eruptions would not always follow the order of infection, *e. g.*, scarlatina contracted any time within a week after an infection with measles or varicella would show itself before either of these.

Of course, the grouping of the diseases depended mainly on their age, incidence, and seasonal prevalence, as well as on their actual frequency; but the question of the modifying influence, if any, exerted by one disease on another was of far greater practical importance, and the conclusions at which Dr. Caiger arrived were: (1) that neither the incubation periods nor the essential phenomena of the diseases were in any way altered, but that (2) one involving considerable constitutional disturbance aggravated that which followed in order of appearance, and those attended with inflammation or hyperæmia of any surface or tissues intensified subsequent diseases which were specially located in those structures. Hence post-scarlatinal diphtheria was worse than scarlatina after diphtheria; but diphtheria following on measles was even more fatal, from its constant extension to the congested air-passages. Varicella had not the slightest influence on any subsequent disease, but when it made its appearance on the hyperæmic skin of a patient suffering, or even convalescing, from scarlatina the eruption and intensity of the disease might rival that of unmodified smallpox.

Of the 48,376 cases of scarlatina admitted into the hospitals of the Board

in the last six years, 3166, or 6.54 per cent., were complicated with some other acute specific, which in 1094 cases was diphtheria. The great frequency of this complication was easily understood when one reflected on the favorable conditions presented by the throat, during or shortly after scarlatina, for the reception of the diphtheritic bacillus, and the fact that one attack of diphtheria, so far from conferring immunity, tended rather, by the unhealthy state of the fauces that often persisted, to render the individual more susceptible than others to infection.

VACCINE AND GLYCERIN.

THE dilution of vaccine lymph with a certain proportion of glycerin has long been practised, especially under the pressure of epidemics and panics, with a view to render a limited supply available for the vaccination of a large number of persons.

Its use in moderation was not found to impair the activity of the lymph, while it presented the advantage of preventing the drying up of the lymph during the prolonged exposure unavoidable under such circumstances, and the procedure was looked on as a harmless sort of adulteration, quite justifiable, though not to be commended in itself.

BUT DR. MONCKTON COPEMAN in his researches on vaccinia, having satisfied himself that the well-known cloudiness that appears in lymph stored in capillary tubes was due, not to coagulation, but to the rapid growth of extraneous aerobic organisms, originally present in the lymph, though in inappreciable numbers, and that they not only caused the progressive deterioration of the lymph by crowding out the specific microbes, but in some cases, at any rate, gave rise to the irregular, excessive, and erysipelatoid inflammations that occasionally followed on vaccination, even when no subsequent infection of the wound from without could be established, turned his attention to this property of glycerin, and with results of the highest practical value. He found that lymph was actually improved by the addition of an equal volume of a 50 per cent. solution of glycerin in sterilized water, not merely remaining perfectly clear and fluid for an indefinite time, but positively gaining in activity for six months at least.

It would appear that, though no purely artificial culture medium has as yet been discovered, there is no necessary tendency to extinction of the microbes in pure cultures in the natural serum so long as the access of air and of foreign micro-organisms is excluded, and that the glycerin, by inhibiting the growth of the latter, permits the proliferation of the proper microbe and the accumulation of their products to go on unchecked; and this is a necessary step in the direction of their isolation and culture under artificial conditions. It is true that their very existence is hypothetical, that they have hitherto eluded, and may indeed forever continue to elude our vision; but this is merely a question of magnitude.¹ If they be as much smaller than those of tubercle or of anthrax as these are than the *torulæ*, it is possi-

¹ Since writing this I have heard that Dr. Copeman has demonstrated the presence in a number of samples of absolutely pure lymph of an extremely minute and hitherto unrecognized bacillus, which can scarce be other than the object of his search, although up to the present he has failed to cultivate it in artificial media.

ble that no magnifying, illumination, or staining will ever suffice for their recognition; but our belief in the specific nature of pathogenic microbes, whether or not confirmed by ocular demonstration, rests rather on the constant results of inoculation experiments, without which we could not positively assert their causal connection with the several diseases, although they might be invariably present.

If the perpetuation of the vaccine lymph in an active state out of the body of man or beast, for which the Grocers' Prize of £1000 was offered, should be achieved, one objection urged by the opponents of vaccination would be removed; but we are already greatly indebted to Dr. Copeman for showing how lymph may be preserved for months absolutely free from any deterioration or enfeeblement.

CITRIC ACID IN THE LOCAL TREATMENT OF DIPHTHERIA.

MOST suggestions for the local treatment of diphtheria have been consciously or unconsciously based on the now well-established fact that the throat affection, which in scarlatina is simply one local manifestation (the rash being another) of a general disease, is in diphtheria the indication of the recent invasion of that particular mucous surface by the bacilli, which do not extend beyond the immediate vicinity of the cervical glands at the farthest, though diffusing thence a poison, as Roux and Yersin have shown; or more accurately, according to Hunter, a ferment that generates the poison to which the general and nervous phenomena are due. To destroy the bacilli on their first landing, as it were, before they have had time to intrench themselves in the deeper tissues, is the aim of such treatment; and the local application of germicides, among which the strong caustics, mineral acids, perchloride of iron, etc., of the older practitioners must be included, as well as the mercury iodide and the eucalyptus oil of Illingworth and Curgenvén respectively, has been productive of more or less encouraging results in lessening the subsequent general infection.

DR. HUGO LASER, assistant in the Hygienic Institute of Königsberg, considering the difficulty of applying caustics in children, and fearing that any injury to the mucous membrane by the use of stiff brushes or otherwise might actually assist the entrance of the bacilli into the submucous tissues, proposed to try citric acid in solutions that should be astringent rather than caustic. ESPINE and DE MARIIGNAC had shown that salicylic and citric acids and lemon juice destroyed both the false membrane and the bacilli [boric acid, alum, and potassium chlorate being quite useless], and ABADIE used it in strong, almost caustic, solution every five hours at first, and every eight to twelve later on. Babès had treated cultures in various ways with a number of established or reputed germicides, of which, under all circumstances, sublimate proved the most active, potassium permanganate far better than one would have expected, and citric, lactic, and acetic acids fairly satisfactory.

Laser confined his attention to citric acid and lime juice (citric acid, $\frac{7}{8}$ per cent.; sugar, etc., $\frac{3}{4}$ per cent., and salt, 2 per cent.), varying his experiments in every way as regards the strength of the acid, the frequency, duration, and mode of its application, and the nature of the culture medium. He next treated portions of diphtheritic membrane by dippings and washing, and last

of all he applied the results in actual clinical practice, using frequent applications, with a full camel's-hair brush, of a 5 to 10 per cent. solution, which, diluted in the proportion of one tablespoonful to a glass of water, he used as a gargle and also internally, the dose in the latter case being from one or two teaspoonfuls for a young child, to a tablespoonful or more for an adult every hour or two.

Raw lemons, in thin slices, should at the same time be eaten, or rather sucked, one or two per diem, or the expressed juice drunk as lemonade.

He does not pretend to have found a specific, but states that of fifteen cases thus treated, some of them with very severe and extensive exudation, fourteen were cured within three days. The only fatal case was that of a child, in which the tonsils, uvula, and nares were involved, streptococci were abundant, and death was brought about through septic infection.

Seventy cases of angina, and twelve in which the diagnosis of diphtheria was doubtful, were treated in like manner, and all recovered in a couple of days.

DETECTION OF TUBERCLE BACILLI IN THE SPUTA WHEN PRESENT IN VERY SMALL NUMBERS.

UNDER such circumstances, and with the usual methods of staining, they may escape detection, and DR. GUTTERSACK recommends:

1. Steeping for twenty-four hours in a very dilute solution of potassium permanganate.
2. Decolorizing by a few seconds' immersion in a 1 or 2 per cent. solution of hydrochloric acid with about 50 per cent. of alcohol.
3. Five minutes' immersion in a concentrated watery solution of potassium bichromate, and,
4. Examination in glycerin, terebene, and monobrom-naphthalene.

The bichromate brings out in clearer definition the outlines of the mucous corpuscles and the cells, and gives to the latter a delicate greenish-yellow hue.

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THE RELATIONS OF INFECTIOUS PROCESSES TO MENTAL DISEASE.¹

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NEARLY a century ago Benjamin Rush, when considering the etiology of intellectual derangement, declared that gout, dropsy, consumption, pregnancy, and fevers of all kinds, produced madness by acting upon the brain in common with the whole body; and in one way or another, before his time and since, the subject assigned to me in the opening of this discussion has claimed the attention of the medical profession. It is one aspect of the old humoral doctrine of disease in general, to which we now recur, aided by experimental research and not simply by clinical and pathological observation.

Are special types of mental disease ever due directly to infection? Are the mental disorders of well-known infectious diseases always toxæmic, or are they sometimes the result of toxæmia and sometimes of anæmia or exhaustion? Are particular types of insanity due to the action of specific micro-organisms? In other words, has acute mania a bacillus which belongs to it, and to it alone; has melancholia its special pathogenetic microbe; is a special type of confusional insanity of microbic origin; has general paralysis of the insane a *bacterium sui generis*? These questions lead us naturally to consider inferences and conclusions drawn—1, from clinical and clinico-pathological observations; 2, from

¹ Read before the Congress of American Physicians and Surgeons, Washington, D. C., June 1, 1894.

the analogies with nervous affections, not psychoses, but which are known or believed to be of microbic origin; 3, from the results of combined clinical, pathological, and bacteriological observations and investigations.

Clinical and clinico-pathological observations have furnished us with a literature comparatively voluminous, but for the purposes of this discussion its teachings can be compressed into a small space. Two valuable contributions are a paper by Hurd¹ on "Post-febrile Insanity," and a report made to the Congress of French Alienists, in August, 1893, by Drs. Regis and Chevalier-Lavaure² on "Auto-Intoxication in Mental Diseases."

Regis and Chevalier-Lavaure refer to many cases of insanity in which neither heredity, organic disease of the nerve centres, nor any of the disturbances designated as neuroses can be assigned as a cause. They attribute the mental disorder in these cases to the excessive production or storing of products which are usually accumulated in much less amount or are eliminated. The blood, organic liquids, and especially the urine, undergo various modifications, their composition changing with the type of mental disease. They distinguish mental disorders as due—1, to infectious diseases; 2, to visceral disturbances; and 3, those associated with diathetic maladies. The second class includes mental disorders of hepatic and renal origin. They refer to the importance of studies of the toxicity of the intestinal contents, which recalls the important researches of Herter³ on the relationship of the toxic products of intestinal putrefaction to epileptic seizures, presented in a paper read before the American Neurological Association in 1892. In the third group of insanities dependent upon auto-intoxication are included those occurring under the influence of such diatheses as arthritism, herpetism, diabetes, cancer, etc. Regis and Chevalier-Lavaure query whether or not general paralysis of the insane is not sometimes due to infection, and Parant, commenting on this suggestion, remarks that we sometimes see cases of mental confusion ending in a progressive paralytic failure, with delusions somewhat different, but with other symptoms of general paralysis, and that, therefore, while this opinion is not susceptible of any great generalization, it is nevertheless based upon actual facts.

With Hurd, I believe that we should recognize the fact that mental disorders described under the general head of confusional insanity—and I might add other types and sub-types—should be regarded as developing either from specific poisoning, from shock, or from anæmia and nervous exhaustion. Under the head of insanity from specific poisons, Hurd

¹ Read before the Medical and Chirurgical Faculty of Maryland, April 28, 1892. *Amer. Journ. of Insanity*, July, 1892.

² Summarized by Parant in the *American Journal of Insanity*, January, 1894, vol. i, No. 3, p. 423.

³ Herter: *Journal of Nervous and Mental Disease*, August, 1892, N. S., vol. xvii. p. 644.

comprises "the delirium of fevers, both intermittent and exanthematous, of pneumonia, of uræmic poisoning, the transient insanity of influenza, the mental confusion of multiple neuritis, the delirium of iodoform, salicylic acid, and chronic alcoholic poisoning, and the delirium of puerperal fever. In this group of cases we have a poison acting directly upon the central or peripheral nervous system, producing an intoxication as shown by incoherence of ideas, confusion and a more or less rapid flow of thought. This poison may be of the nature of uræmia or of some toxic albumins—Welch has shown these to be produced in pneumonia and diphtheria, which possess a special toxicity to the nervous system—or an intoxicating drug which has a prolonged action. These poisons produce an active delirium which is generally self-limited and disappears when the exciting cause is removed and the period of convalescence established." While fully admitting the development of insanity from specific poisons, Hurd believes, however, that mistakes have arisen by confounding the confusion of febrile delirium with true post-febrile insanity. As the essential feature of delirium is mental confusion, and as delirium is often the product of toxæmia, well illustrated by drug-intoxications, this febrile delirium, at least, is toxic in origin; the insanity which follows may sometimes be due to persisting toxæmia, but in many cases it is the result of shock, anæmia, or nervous exhaustion.

Between 1834 and 1865, Chomel, Esquirol, Simon, Sauvet, Thore and Baillarger—cited by Hurd—described the mental disorders that accompany typhoid and other forms of fever, and among later writers Clouston,¹ Wood,² and Tuke and Woodhead,³ have especially considered the subject. Febrile and post-febrile insanities have been shown by Nasse⁴ and Spitzka⁵ to be of not rare occurrence in children; the fevers, during or after which they develop most often these mental affections, being typhoid, scarlet fever, measles, rheumatism, and diphtheria. Clouston and Wood both regard post-febrile insanity as due to the anæmia and exhaustion which result from acute infectious disorders; and the latter has proposed to include under "confusional insanity" a special group of cases following infectious diseases, injuries, operations, and other causes. Korsakoff⁶ regards the mental confusion, or confusional insanity, described by Clouston, Wood, Hurd, and others preceding them, as essentially a toxæmia, due to a special poison such as is developed in multiple neuritis, influenza, and other infectious disorders. According to Tuke and Woodhead, in the acute maniacal delirium which occasion-

¹ Clouston: *Clinical Lectures on Mental Diseases*, 1884, p. 416.

² Wood: *University Medical Magazine*, Dec. 1889, vol. ii. p. 117.

³ Tuke and Woodhead: *Tuke's Dictionary of Psychological Medicine*, vol. ii. p. 911.

⁴ Nasse: *Allgemeine Zeitschrift für Psychiatrie*, Berlin, 1870, p. 11.

⁵ Spitzka: *Keating's Cyclopædia of the Diseases of Children*, vol. iv. p. 1046.

⁶ Korsakoff: *Allgemeine Zeitschrift für Psychiatrie*, 1889, H. 4, p. 475.

ally presents itself during the course of infective fevers, the two factors which should be taken into consideration are: first, the specific poison which appears to act directly on the nerve cells, giving rise to stimulation and impaired nutrition and consequent granular degeneration; and secondly, the high temperature during the persistence of which metabolic, or to speak more accurately catabolic, processes go on rapidly. In very acute cases extraordinary proliferation of connective-tissue cells round the vessels, and migration of leucocytes, take place—this being a condition commonly associated with the presence of micro-organisms, and well marked in acute exudative meningitis.

Numerous isolated cases of acute delirium, acute mania, acute confusional insanity, so called, and other forms of acute mental disease, variously designated, occurring in connection with fevers like typhoid, have in recent years been reported in medical journals, but I can only here refer to a very few of these.

An argument in favor of the mental disorders of infectious diseases being due to toxæmia rather than to anæmia or exhaustion is furnished by the well-known fact that such diseases are sometimes ushered in by violent mental manifestations, or that such manifestations are the chief features of the disease, which pursues a course which is largely afebrile. I have seen and recorded several cases of typhoid fever which began or were preceded by an acute delirium, which closely simulated, and in some cases was diagnosed as, common acute mania. A form of afebrile typhoid fever with severe cerebral symptoms has been recorded by Gerloczy:¹

A girl, nine years old, was taken sick with headache, chill, and fever, and soon became noisy and restless, and eleven days after the onset was comatose and screamed and tossed incessantly. Meningitis was suspected; the temperature never rose above 39° C. The treatment consisted of ice-cap and small doses of chloral at night. On the seventeenth day of the disease she became more quiet, so that an examination was possible, and this among other things showed a swollen spleen. From this time a gradual improvement took place. On the twenty-fifth day the child became conscious, and from the twentieth to the thirtieth numerous furuncles developed. Convalescence was interrupted by a rubeolous eruption without fever, but otherwise progressed favorably.

Chaslin² has described a form of mental disorder, usually acute, which is neither mania nor melancholia, which may be attributed to a rapid depression of the nerve centres from infection or auto-intoxication, and which he believed to be an intermediary form between functional psychoses and insanities with well-marked and profound lesions—although it assumes often the character of a true disease by the somatic

¹ Gerloczy : Deutsche med. Wochenschr., April 14, 1892, No. 15, p. 328.

² Chaslin : Annales Médico-psychologiques, Paris, 1892, p. 225. Cited in La Semaine Médicale, Paris, August 10, 1892.

phenomena. It is characterized by confusion of ideas, perception, and personal apperception. It may or may not be accompanied by hallucinations; motor agitations, depression, or stupor may be present. The disorder has a great analogy with the delirium of chronic intoxication, and has been designated under the name of "mental confusion." Cases similar to Chaslin's have been recorded by others. Liebermeister has attributed the great depression of temperature in such cases to the action of a virus—microbic or chemical—on the heat-regulating centres. The insanity of sunstroke is probably dependent upon a toxic condition, and by some is believed to be the result of catabolic changes produced by high temperature.¹

The somatic and psychical cerebral symptoms which accompany these infectious febrile disorders are not infrequently attributed to meningitis, or even encephalitis, and the patients are sometimes treated on the supposition that they are suffering from intracranial inflammatory affections, which are indeed occasionally present. These diagnoses are seldom corroborated by autopsies, and with our present lights the evidence—clinical and pathological—points rather to toxæmia.

Lloyd² and Tull³ have reported cases of acute delirium without recognizable cause, leaning to the view that many such cases are infective in nature. The temperature in Tull's case—also seen by Lloyd—before death rose to 103.4° F. The autopsy revealed an uncertain incipient meningitis. Much negative pathological evidence in favor of the toxæmic origin of acute delirious seizures, like that afforded by the case of Lloyd and Tull, might be adduced, as many cases have been reported in which the autopsies were practically negative in their findings. My own experience has afforded several such cases, one of which is recorded in another paper.⁴ I assisted at the autopsy of this case in the post-mortem room of the Philadelphia Hospital:

The woman, a patient of Dr. E. P. Davis, three hours before she was brought to the hospital by the police patrol, had been delivered of a child. She was in a state of acute mania, and her limbs were extremely hyperæsthetic, with active contractures, and a scattered petechial eruption. The symptoms were suggestive of a cerebro-spinal meningitis with diffuse neuritis; but the autopsy showed clearly that no meningitis was present, and doubtless the case was one of toxæmia associated with anæmia.

The modifying influence which it is claimed is exerted by certain infectious diseases on mental disease is worthy of passing notice in view of the present ideas regarding toxins and anti-toxines. Mayberry⁵ has referred especially to the influence of facial erysipelas in cases of melan-

¹ J. Batty Tuke and German Sims Woodhead: Tuke's Dict. Psych. Med., 1892, vol. ii. p. 911.

² Lloyd: Medical News, Jan. 31, 1891, vol. lviii. p. 122.

³ Tull: Ibid. p. 127.

⁴ University Medical Magazine, May, 1893, vol. v. p. 611.

⁵ Mayberry: Journal of Nervous and Mental Diseases, May, 1894, N. S., vol. xix. p. 298.

cholia; and Dinter, cited by Mayberry, has reported two cases of melancholia with erysipelas, one of which went on to recovery, and the other was improved only for a single day. In an epidemic of forty-four cases of facial erysipelas, Mayberry gives the results of the disease upon the mental condition as follows: "Three were cases of acute melancholia, one of whom went on to rapid recovery, one slowly improved from the time of the disease, and one remained unchanged; the two former were simple melancholia, and the latter melancholia agitata. Nine were cases of chronic melancholia, two of whom were temporarily improved; in one, a case of melancholia agitata, the delusions were more marked and the agitation greater; and six remained unchanged. One was a case of stuporous insanity, which seemed to begin to improve from the date of the sickness. Four were cases of acute mania, all of whom remained unchanged. Eleven were cases of chronic mania, one of whom had a lucid interval, while the other ten were not appreciably affected. Three were cases of parietic dementia, two of whom showed greater deterioration, and one remained unchanged. Two of epileptic mania remained unchanged. One of senile dementia became mentally weaker. Ten of terminal dementia showed no change." From these and similar observations on other cases, Mayberry was led to believe that erysipelas is more likely to favorably influence depressed cases of insanity of a comparatively short duration.

To the consideration of the analogies of certain insanities with affections of the nervous system not psychoses nor insanities, but which are known or believed to be of microbic origin, I shall give brief space, as this aspect of the discussion has necessarily been largely treated of by my colleagues. In the affections which are now claimed as microbic, some with a strong showing of facts and arguments, and some with evidence as conclusive as can be furnished by medical science, are now included multiple neuritis, some forms of myelitis, tetanus, tetany, Landry's paralysis, chorea, epilepsy, disseminated sclerosis, and paralysis agitans. Nearly all of these affections have or may have mental disorders associated with them.

The mental disorders of multiple neuritis have been frequently recorded. Several years ago¹ I called attention to the concurrence of multiple neuritis with both myelitis and encephalitis, but I believe now that most of these cases with mental symptoms were instances of toxæmia rather than encephalic inflammation. Fisher² has reported a case of multiple neuritis in which loss of time and place were marked symptoms—a similar condition to that which occurs in drug-toxæmias. Since the recent series of influenzal epidemics first appeared I have seen many cases of acute and chronic mental disease directly or indirectly

¹ Mills: *Journ. of Nerv. and Ment. Dis.*, 1887, vol. xiv. p. 209.

² Fisher: *N. Y. Medical Journal*, Feb. 13, 1892, vol. lv. p. 186.

its offspring, and often associated with neuritis. A few of these have been fatal cases of acute mania, during or following closely upon the heels of the influenzal attack, but many have been chronic and milder forms of insanity or of mental disorder, not rising to the dignity of true insanity. To most of these I have referred more at length elsewhere.¹

The microbic origin of some forms of myelitis with which mental affections are occasionally associated is now generally admitted; and choreic insanities with mental manifestations equalling in violence the motor disorder are well known. Regis² has reported a case of choreic insanity with a form of delirium which seemed to be closely akin to that of alcoholic delirium. Dana³ has reported an interesting case, with autopsy and bacteriological investigation, in which was found a micro-organism closely resembling the diplococcus lanceolatus, which, he believes, gives weight to the belief that in some cases at least a microbe produces the disease.

Marie,⁴ in his great work on *Diseases of the Spinal Cord*, has expressed his profound conviction that the most efficient cause of disseminated sclerosis is infection, or rather *infections*. As early as 1884 he asserted in categorical fashion this relation of cause and effect, having collected twenty-five cases in which disseminated sclerosis had followed acute diseases; a certain number of these cases having been described in 1879 in a memoir of Kahler and Pick. Marie holds that in certain infectious maladies symptoms of central nervous affection may develop during convalescence, and later may amend and disappear, but sometimes sclerosis, and especially disseminated sclerosis, arises with greater or less rapidity. He does not contend that disseminated sclerosis has its special microbe, but that this condition may appear in a crowd of infectious diseases which differ very much, one from the other; and that it is most frequently the result of one of the combined infections so frequent in the course of different infectious diseases. The infection is not so much due to a special microbe as it is to the localization of the infectious agencies in the nerve centres. If we accept the view of Marie regarding disseminated sclerosis, the same reasoning would lead us to believe that other forms of sclerosis and general paralysis of the insane—and perhaps neuro-systemic degenerations in general—are due to infection. Marie's⁵ observations on the poliomyelitic origin of the lesions of the white medullary fasciculi in pellagra, general paralysis, and different combined scleroses, are of great importance in this connection.

¹ Mills: Trans. Phila. Co. Med. Soc., June 13, 1892, and Medical News, Jan. 30, 1892, p. 118.

² Regis: Journ. de Médecine de Bordeaux, July 20, 1890.

³ Dana: Amer. Journ. Med. Sci., Jan., 1894, vol. cvii., No. 1, p. 31.

⁴ Marie: Leçons sur les Maladies de la Moelle, 1892, pp. 140-142.

⁵ Marie: La Semaine Médicale, Jan. 13, 1894, p. 17.

Passing to the consideration of the results of combined clinical, pathological, and bacteriological investigations, the most valuable contribution which has thus far come from an association of clinical and laboratory work is an article entitled "A Contribution to the Etiology and Pathogenesis of Acute Delirium," by Dr. Carlo Rasori,¹ assistant physician to the Hospital for the Insane, at Bologna, the work emanating from Tizzoni's Laboratory for General Pathology.

As Rasori's paper is of great importance to our subject, and as it has not received the attention it deserves from the medical journals of this country, I shall refer in detail to its results.

Rasori describes in detail a case of acute delirium, with autopsy and the results of a careful bacteriological examination. At the outset he defines what he means by acute delirium, referring to the published work on this subject of Prof. Bianchi,² who has compiled the literature of the subject. A study of Bianchi's article shows, according to Rasori, that while authors agree upon the clinical picture and anatomico-pathological findings, their opinions with reference to the etiology and pathogenesis are often different and contradictory, and Rasori believes these differences are largely due to confounding different disorders and to the existence of transition forms, the most varying types of insanity having clinical episodes which sometimes give the picture of acute delirium. Acute delirium, as accepted by Rasori, is based upon Bianchi's descriptive definition—a general affection of the brain cortex which leads to a rapidly increasing and soon culminating dissolution of the psychical personality; with varying but severe disturbances of the senses and active excited movements; with quiet periods almost to the absence of consciousness; with intermissions of calmness; with convulsions, fever, early emaciation, rapid coma, and usually a fatal termination in from one to three weeks.

Rasori's patient was a woman, forty-five years old, without previous history of any moment. Her attack came on with persistent headache. She became confused and excited, talkative and incoherent, with a tendency to purposeless actions and to destructiveness, and refusal to take food. Her face was congested. She became noisier and more confused, consciousness was much disturbed, and she seemed to be the victim of terrible visual and aural hallucinations. Both pupils were sluggish and large, the right a little larger than the left. She had no fever, but she grew rapidly worse, developing opisthotonus, with clonic spasms of the facial muscles; noisy respiration, difficult deglutition, retention of urine, and rapid symptoms of exhaustion. Her temperature at the beginning was 38.5° C. On the evening before her death it reached 39.6° C. She died two weeks after the first appearance of the mental symptoms.

¹ Centralblatt für Bakteriologie und Parasitenkunde, October 20, 1893, Bd. xiv., No. 16, Jena, p. 509.

² Bianchi: Sull' Origine Infettiva di una forma di Delirio Acuto, per Prof. L. Bianchi e Dott. F. Piccinino (estratto degli Atti della R. Acad. Med.-chirurg. di Napoli, anno lxvii., Gennaio, Febbraio, N. s., No. 1). Napoli (Stab. Tipogr. A. Tocco, Cav. A. Tocco, S. Pietro a Maiella 31), 1893. Reference cited from Rasori's article, as I have not access to the publication of Bianchi.

The autopsy was conducted with the strictest antiseptic and bacteriological precautions. With a sterilized syringe fluid was removed from below the dura, and a part of it deposited in a sterilized tube of obliquely congealed agar, and these tubes were placed in a thermostat at about 35° C.

Marked congestion was present in the meninges and brain substance, also œdema and several hemorrhagic spots below the membranes. In the right temporal lobe the cortical substance was softened. The lungs were emphysematous, the lower lobes showing hypostasis and œdema, and an adhesive pleuritis on the left. The colon had areas of congestion.

Two inoculations with subdural fluid led to the development of the same micro-organisms, a small bacillus with rounded ends, three times as long as its width. Usually it appeared alone, but sometimes two or three were found hanging together by their ends. Besides the typical forms, others longer and either straight or twisted were present; these took the stain less readily. Rasori made numerous experiments and found that the micro-organism grew well in different culture media. His experiments with gelatin, bouillon, and agar cultures are given in detail. He was not able to say anything concerning the influence of physical or chemical agents upon the vitality of the micro-organism or the possibility of its development in amœbic conditions; he was only certain that its life was of short duration if the culture medium was not the proper one. He made a series of four inoculation experiments upon rabbits to establish the pathogenetic effect of the micro-organisms. The inoculations were made as follows: 1. Below the dura; 2. Below the skin; 3. Into the nose; and 4. A subcutaneous inoculation of a culture of blood agar obtained from the second experiment. Rigid antiseptics was employed.

The experiments demonstrated that the bacillus obtained from the subdural fluid of the patient grew and multiplied in the body of the rabbit, and produced a toxic substance which destroyed the animal, with symptoms of acute septicæmia, at a period varying from one and a half to six days.

The post-mortem findings of the animals were: Hyperæmia of the meninges, sub-pial hemorrhages, staining of the lungs, liver, and kidneys, and swelling of the spleen. Preparations were taken from the brain and spinal cord which showed, in addition to nervous elements and leucocytes, rich cultures of the kinds used in the inoculations.

"It would be premature," says Rasori, "to draw positive conclusions, from so small a number of experiments, about the special conditions which favor the natural infection, as well as about the most likely way permitting this micro-organism to enter the human organism, where it exerts its influence especially upon the central nervous system, as appears from the picture of this disease—which is usually fatal, according to the most prominent alienists. I reserve the privilege of completing in due time the investigations contained in this communication, and also of announcing the results of the histological observations which I shall make in the future."

In August, 1893, in consultation with Dr. Charles S. Potts and Dr. J. F. Berlet, of Philadelphia, I saw a case of acute delirious mania, a report of which has been made to the Philadelphia Neurological Society by Dr. Potts.¹ The patient, a professional man, thirty-three years of age, in the preceding June had been attacked with urticaria, lasting until August, when a carbuncle made its appearance on his upper lip. This was opened and curetted. For several days prior to the operation he had taken rather large quantities of whiskey and morphine; but these were stopped, and he did well for nine days, when he became violently delirious, with hallucinations, delusions, incoherence, great agitation and excitement. His temperature remained normal until three days after the attack, when it rose to 101° F., and continued to increase

¹ Potts: *Journal of Nervous and Mental Disease*, May, 1894, N. S., vol. xix. p. 338.

until three hours before death, when it reached 108.2°, at which time delirium gave place to coma. The autopsy, made seventeen hours after death, by Dr. J. W. McConnell, in the presence of Drs. Potts, Berlet, Klemm, and the writer, was practically negative. Cultures were made from the cerebro-spinal fluid by Dr. D. Braden Kyle, and demonstrated the presence of the so-called streptococcus lanceolatus, or pneumococcus of Fränkel and Weichselbaum, and also the staphylococcus pyogenes aureus and albus. Microscopical examination of the cortex showed perivascular exudation and leucocytes in the lymph-sheaths and perigangliar spaces. Dr. Potts, in reporting the case, suggests that as the germs isolated were those usually found in meningitis, the lack of microscopic findings was probably due to the fact that the toxæmia was so violent as to cause the death of the patient before naked-eye appearances had time to develop.

Through the kindness of Dr. M. V. Ball, of Philadelphia—to whom I am indebted for assistance and valuable suggestions in the preparation of this paper—I am able to present the report of an unpublished case of acute delirium with autopsy, and the results of a careful bacteriological examination.

The patient, a German, fifty-five years old, with a negative previous history, except of gonorrhœa and occasional rheumatic attacks, had been confined in prison for nearly eighteen months. He was suddenly attacked with delirium, having previously been to all intents and purposes in the best of health. He had marked delusions with hallucinations, and believed that people were coming to attack him. In his frenzy he tore up the furniture of his cell, destroyed his own property, and threatened death to anyone who would enter his cell. It became necessary to overpower him, but this was done as carefully as possible; and he was seen by Dr. Ball an hour after he had quieted down. He recognized the doctor, said that he felt dizzy, and that he believed this was due to a fall from his carriage some years before. Every now and then he would stoop down as if to pick up something, apparently because of hallucinations of sight. His whole appearance was of one in a fit of alcoholic delirium, but he had not had any liquor for eighteen months. He was given a mixture of hyoscyamus and bromide, and next morning seemed to be in a state of unnatural gladness. He had no fever, ate his food, and made no complaints; but he had said to his keeper, "If they are going to take me out to hang me they had better do so before breakfast"—clearly indicating delusions of persecution. In the evening he was quiet, but the next morning he was found hanging to the door of his cell, having strangled himself with the band of his pantaloons. When found he had evidently been dead several hours. The autopsy revealed under the dura several fresh patches of exudation; the pia was glassy and covered with two or three spots of a greenish-white exudate; the ventricles did not contain an unusual amount of serum. Three small round cysts filled with a milkish-colored gelatinous fluid were found in the choroid plexus on each side. Cultures were obtained from the ventricle serum and from the contents of the cysts.

The following is an extract from Dr. Ball's bacteriological report:

"In both cases in two days a fine growth occurred along the needle-track in a gelatin-agar tube—a sparse whitish growth on the surface of

the tube, not liquefying. The germ obtained was a very small bacterium arranged in twos and threes, resembling micrococci very much, but plainly larger in one diameter than in the other. Most curious was the growth or rather formation of needle-shaped crystals along the growth of the germ. The fine white, six-sided crystals arranged themselves in bundles and stars, giving a growth of most characteristic appearance. From the original growth many cultures have been obtained, giving rise to the same peculiarity. In gelatin alone, however, it has not been obtained, but in pure agar and in gelatin-agar there has been no difficulty. A chemist who made an examination of the crystals believes them to be a sulphate of some kind. I had an idea that it was a nitrite, but the reaction for nitric acid or ammonia was not obtained. The crystals can be plainly seen with the naked eye. What relation they bear to the growth is, of course, undeterminable without further study. The bacillus of lactic acid is the only germ on record which gives rise to crystals along its culture."¹

I am indebted to Dr. James R. Hunt, interne of the Hospital of the University of Pennsylvania, for the notes of another unpublished case of considerable interest. The patient was under the care of Dr. John Ashhurst, Jr., in the surgical wards of the University Hospital, who has kindly permitted me to refer to the case in this connection.

The patient was a German laborer, twenty-six years of age, who presented a history of obscure renal disease extending over a period of six years. A distinct resistance was felt in the region of the right kidney, which was quite tender on pressure. The urine contained numerous

¹ The preparations and procedures necessary for a bacteriological examination of the brain have been kindly summarized for me by Dr. Ball. The materials necessary to be at hand are a platinum needle, clean scissors, three nutrient agar tubes, three nutrient gelatin tubes, three nutrient blood-serum tubes, three nutrient bouillon tubes, a one per cent. sublimate solution, and an alcohol lamp or Bunsen burner.

The precautions necessary are: 1, that the tissue must not be exposed longer than absolutely necessary; 2, the instruments and needles must be passed through flame before touching the tissue; 3, the tissue must be at once conveyed to the nutrient or medium, and in doing this every contamination must be avoided—the cotton plugs, for instance, when removed from the tubes must be singed before they are taken out, and before they are replaced; 4, if the nutrient material is fresh, one tube of each kind must be kept for control experiments; 5, have labels on the tubes so that they can be marked at once.

After the calvarium has been removed, wash the dura with the sublimate solution, then, with the scissors—which have been sterilized in the flame—lift off a small portion of the dura, and if any subdural fluid is present, with a sterilized ear-spoon, such as in ordinary use, obtain a few drops, and inoculate at once one of the bouillon tubes with it. Without much exposure snip off a piece of the cortex with the sterilized scissors, and drop it into the second bouillon tube, and likewise obtain a small piece for one agar and one blood-serum tube. If there is any inflammatory exudate, dip the sterilized platinum needle into it, and then quickly inoculate a gelatin tube by thrusting the needle into the gelatin and withdrawing it. A stroke culture can be obtained by smearing the top of the agar in one of the tubes with the infected needle. Open the ventricles carefully with a sterilized knife or scissors, and with the platinum needle looped, or with the ear-spoon, obtain a few drops for the inoculation of the third bouillon tube and one blood-serum tube. The other tubes can be reserved for different portions of the cerebrum.

After the tubes have been inoculated, place two bouillon and two agar and two blood-serum tubes in the inoculating-oven at 35° C., and watch developments. The other bouillon tube is left in the room at ordinary temperature, likewise with the gelatin and the other agar and blood-serum tubes. If a distinct microbe is determined, its nature must be studied by experiments on animals.

pus-cells, but no blood and no crystals. An exploratory operation was performed.

A needle was thrust into the kidney substance in various directions in search of a calculus, but with negative results. A large drainage-tube was placed in the wound, which was closed. The day following the operation the patient became unmanageable, tearing and displacing the dressings, and on one occasion, while unobserved, he tottered down the ward. Beginning a few hours after this, there was almost complete suppression of urine, lasting forty-eight hours; but under treatment the secretion was re-established for a period of twenty-four hours, which was followed again by almost complete suppression, which lasted until death. Examination of the dressings showed pus and urine. A urinary fistula was evidently present. The man was irrational immediately after the operation, and this state gradually merged into one of moderate delirium, which on the seventh day amounted to actual mania, this lasting until death, which occurred ten days after the operation. The autopsy was made by Dr. H. W. Cattell. The right kidney lay in a bed of foul-smelling somewhat greenish pus resembling tubercular sputum. On section the renal substance was found infiltrated with pus, with great destruction of its upper portion. The kidney was of the large white variety, and contained a large, rather friable calculus, a perfect mould of the pelvis, infundibuli, and calices. The right ureter was thickened, but otherwise normal; the left presented a hydronephrosis, and on closer examination a stone the size of a lima bean of medium size was found plugging it at the junction of its inner and middle third. Examination of the brain and meninges was negative, with the exception of a slight haziness of the pia and some turbidity of the fluid in the lateral ventricles.

Cultures made from the meninges were negative; but from the fluid found in the lateral ventricles a pure culture of the bacillus pyocyaneus was obtained. Cultures from the pus in and about the kidney contained yeast and pus organisms, but not the bacillus obtained from the ventricular fluid.

The toxæmias of pregnancy and the puerperal state which result in mental disorder cannot be passed by in a discussion of this subject; indeed, thoroughly studied, they might afford the best foundation upon which to build our discussion. Davis,¹ who has recently contributed a brief but valuable clinical paper on the toxæmia of pregnancy, believes that the mode of production of the toxine or poisonous waste which threatens pregnant women is not clearly explained; that while the usual metabolic processes account for a portion of the material present, a certain number of the cases point strongly to an acute intoxication due to the products of bacteria. In one of his cases in which marked toxæmia was present, the examination of the urine failed to reveal either casts, albumin, or marked deficiency in urea. Pronounced symptoms were present, as coronal and frontal headache and extreme restlessness and melancholia, greatly exceeding the usual timidity manifested by patients in the pregnant condition.

¹ Davis: AMER. JOURN. OF THE MED. SCI., Feb., 1894, vol. cvii. p. 147.

Tuke and Woodhead¹ believe that in puerperal insanity a considerable proportion of cases is due to toxic influences, for although a woman may become insane during her puerperal period, her case need not be referable primarily to childbirth. "However, the violent delirious mania which sometimes develops within fifteen days after delivery has all the aspect of toxic influences. The sudden inception, delirious character, rapid development, inflammatory complications, and tendency to death are eminently suggestive of septic origin. Such cases seldom present themselves later than a fortnight after childbirth (the period during which septic changes go on in the uterus), and more frequently they occur within ten days."

Olhausen,² in five and a quarter years, observed psychoses following eclampsia eleven times in two hundred cases. They occur early, seldom later than from two to four days, and are marked by constancy of hallucinations, rapid afebrile course, and generally favorable termination. They are doubtlessly intoxication-psychoses, closely related to uræmic changes in the blood. He suggests the following classification: 1. Psychoses directly due to febrile puerperal processes (infection-psychoses). 2. Idiopathic psychoses without bodily or febrile disease (lactation, acute anæmia). 3. Intoxication-psychoses, following eclampsia, or, exceptionally, uræmia without eclampsia.

While the mental disorders of the puerperium, like many other of its disastrous affections, are usually dependent upon the attendant and the surroundings of the puerperal woman, auto-infection has been claimed as an explanation of those cases which occur when every precaution has been taken. This question has been subjected to bacteriological investigation, especially by Williams,³ who believes that the term auto-infection is not well chosen. Numerous careful bacteriological investigations have shown that the vaginal secretions of pregnant women are of two kinds—normal and pathological. The bacillus of the normal secretion is non-pathogenic, and, on the whole, is rather inimical to pus-producing organisms. In 10 per cent. of the cases with pathological vaginal secretion Döderlein⁴ found the streptococcus pyogenes, which was demonstrated by inoculation experiments to be pathogenic in more than one-half of the cases, and these observations have been confirmed by Williams. The bacteria of puerperal infection, as summarized by Williams, are the streptococcus pyogenes, the staphylococcus aureus and albus, the gonococcus, and the colon bacillus. He holds that it is also quite probable that some of the putrefactive organisms play an important part in what Matthew Duncan has designated as sapræmia.

¹ Tuke and Woodhead: Tuke's Dict. Psych. Med., 1892, vol. ii. p. 911.

² Olhausen: Zeitschr. f. Geb., Bd. 21.

³ Williams: AMER. JOURN. OF THE MED. SCI., July, 1893, vol. xvi. p. 45.

⁴ Döderlein: Das Scheidensekret und seine Bedeutung für das Puerperalfieber. Leipzig, 1892.

While, so far as I have been able to learn, no satisfactory bacteriological examination has been made in a case of puerperal mania, Kaltenbach¹ or rather Gerdes² under the direction of Kaltenbach, made an exact and exhaustive bacteriological examination of the organs of a woman who died of puerperal convulsions; and the results obtained in this investigation would have equal significance in the explanation of fatal puerperal mania. Cultures were made from the lungs, kidneys, liver, and the aortic blood, and in all cases a growth developed which consisted entirely of a pure culture of a very short, thick bacillus. Its culture showed certain characteristic peculiarities. Injections into mice proved rapidly fatal, clonic convulsions occurring in about an hour, followed by death in stupor from nine to twenty hours. Relatively large doses of morphine, administered previous to the injection of the culture, prevented the occurrence of convulsions and saved the life of the animals. This drug, however, only prevents the effect of the germ, and does not inhibit its multiplication in the body. The rat is quite refractory to this germ, needing large doses; rabbits, pigeons, and guinea-pigs are refractory. Gerdes suggests a very careful bacteriological examination of all fatal cases of puerperal eclampsia. In a later article, Gerdes³ declares—1. That the eclampsia bacillus is the sole cause of puerperal eclampsia, and is found in no other disease, and there can be no eclampsia without its presence; and that the infection proceeds from the uterus, probably from an endometritis existing prior to conception. 2. That convulsions due to other causes, occurring during labor, are to be strictly separated, on the basis of the post-mortem appearances, from true puerperal eclampsia. 3. Eclampsia is a well-characterized disease, strictly limited anatomically. 4. The profound changes found in the organs of eclamptic patients post-mortem are not adequately explained by the demonstration of the presence of the specific germ in the body, but are probably due, directly or indirectly, to its toxins.

It must be noted, however, that several obstetricians and bacteriologists have reached different conclusions from Gerdes. Hofmeister, Hagler, and Döderlein agree in declaring that they have not been able to convince themselves that the bacillus found by Gerdes is the cause of eclampsia. Hergott made cultures from the organs in seven cases of eclampsia without results. From the urine he isolated a bacillus in five cases. This bacillus was not identical with that of Gerdes. It had some pathogenic action on pregnant rabbits, but Hergott believes that this is due to its action on the kidneys.⁴

¹ Kaltenbach; Wiener med. Blaett., 1892, No. 21.

² Gerdes. Ibid, 1892.

³ Gerdes; Deutsche med. Wochenschr., June 30, 1892, No. 26, p. 603.

⁴ Wien. med. Wochenschr., 1893, No. 22. Cited in Rev. Insanity and Nerv. Dis., December, 1893, vol. iv. No. 2.

Conclusions may be drawn as follows:

1. Specific infection must be included among the causes of mental symptoms and diseases which precede, accompany, or follow febrile and other infectious disorders.

2. Much negative evidence can be adduced in favor of acute delirium or acute mania being due to toxæmia—such evidence as is afforded by autopsies which reveal neither gross nor histological lesions; and in these cases the toxæmia probably overwhelms the patient before the production of meningitis or other disease.

3. Analogies with nervous affections which are known or believed to be of microbic origin—such as multiple neuritis, myelitis, and chorea—favor the view that insanities with similar or related phenomena and lesions are also microbic in origin.

4. The evidence afforded by careful bacteriological investigation of cases of acute insanity is thus far meagre, and shows that various micro-organisms may induce the same or similar types of mental disease.

5. The mental disorders of pregnancy and the puerperal state are probably, in a considerable proportion of cases, toxæmic, without reference primarily to childbirth; but it cannot be regarded as proved that a bacillus of either eclampsia or puerperal mania is the sole cause of these affections.

A CONTRIBUTION TO THE LOCALIZATION OF THE MUSCULAR SENSE.

BY DR. M. ALLEN STARR,

AND

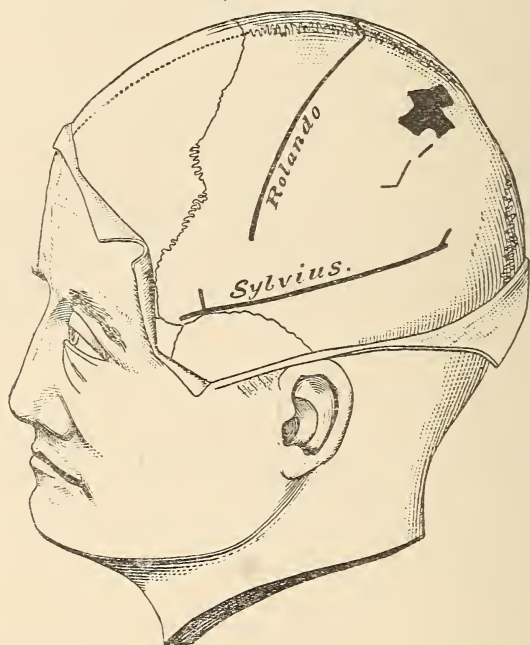
DR. A. J. MCCOSH,
OF NEW YORK.

THERE has been some discussion in regard to the existence of a muscular sense, or sense of the position of the limbs as derived from sensations arising in the surface, joints, and muscles, which can serve as a guide to movement. It has been claimed by some that a perception of movement is an inherent power of the motor area. It has been held by others that a muscular sense is separate from the voluntary motor function, and that it has a different cortical localization.

Without entering fully into this discussion, we desire to record the following very interesting case, which seems to give conclusive proof that the muscular sense has a localization of its own entirely independent of the motor impulse. The case is quite comparable to an accurate physiological experiment upon the cortex of the brain, although, as will

be evident to the reader, no such experiment was intended. We have not been able to find in the literature of the subject any similar case.

Traumatic epilepsy characterized by psychical attacks; headache; trephining; removal of small angioma; loss of muscular sense in the right arm, lasting six weeks; recovery.—S. F., aged twenty-one, is the son of healthy and intelligent parents, with a personal and family history free from any rheumatic or syphilitic taint or alcoholic habit. Up to his fifth year he was a bright and healthy child. He then received a severe fall on his head, followed by unconsciousness for twelve hours. Since that accident he never completely regained his mental balance, and has suffered from pain on the left side of his head. He seemed fairly bright



at his lessons, and was willing to study, but was very easily excited and accustomed to give way without adequate cause to emotional impulses, either of joy or anger. When sixteen years of age he received a second fall on his head, followed again by unconsciousness for several hours. Since the second accident all his symptoms have been decidedly aggravated. The headache is located by him in the left parietal and occipital regions, and the maximum point of pain seems to be at a point half-way from the parietal boss to the median line, and at this spot a small scar can be seen, and there can be felt a slight irregularity of the surface of the skull, suggestive of a fracture. The pain from which he suffered, though continuous, was subject to exacerbations. In connection with the sudden increase of pain, the boy would develop a maniacal condition, in which his actions were extravagant, his speech abusive and profane, and in which he at times indulged in acts of violence toward

his family and employers. In consequence of these attacks, which occurred every few days, or, when under treatment by bromides, every three or four weeks, he was unable to keep up with his classes at school or to pursue any steady employment.

He was not particularly bright or intelligent, though he could not be said in any sense to be demented. Between the attacks he had no clear recollection of what had occurred during an attack, and on several occasions he had lost consciousness; he had never had any convulsions. All remedies having failed to produce any relief of these distressing symptoms, it was thought justifiable to trephine him at the site of the pain. It was thought that in all probability there had been a fracture of the skull at the time of the fall and a local pachymeningitis beneath the fracture, as well as some injury of the brain substance. Very careful tests made before the operation failed to reveal any disturbance of the special senses or any disturbance of motion.

Operation, February 10, 1894. After reflection of the scalp flap, considerable thickening of the tissues was noticed, especially of the pericranium, which was very adherent to the skull. Directly under the cicatrix was a slight linear depression upon the surface of the bone. With an inch trephine a button of bone was removed, its centre being one and a quarter inches to the left of the median line, one and three-quarters inches behind the fissure of Rolando, and an inch above the parietal bone. There was no evidence of fracture on the inner table, and the dura mater appeared normal. The opening in the skull was enlarged by rongeur forceps. When the dura was incised and reflected there was no evidence of any internal pachymeningitis, but the surface of the brain and pia presented an abnormal appearance. A large number of veins of the pia mater appeared to be distended and increased in size, so that a vascular mass consisting exclusively of veins was present just under the trephine opening. This mass of veins, covering a space three-quarters of an inch in diameter, contrasted very markedly with the normal appearance of the pia at adjacent portions. The larger veins leading into this mass of vessels were tied with catgut, which was passed in a needle under the vessels, and probably at four points the superficial layer of the brain cortex was slightly lacerated by the passage of the needle and the tying of the ligature. The brain cortex about this mass appeared to be normal, but it was explored by the hypodermatic needle with a view of the possibility of finding some cyst beneath; nothing was found. The wound was then closed. Recovery from the surgical operation was steady and progressive. He was fit to be discharged from the hospital in ten days.

Immediately after the operation the boy noticed a peculiar awkwardness in his right hand and arm. When examined this was found to consist of a most pronounced condition of ataxia, all finer co-ordination of movement being impossible. Thus any attempt to grasp a pencil or a glass of water, or to pick up a pin, resulted in most excessive motions without the possibility of carrying out the desired movement; the attempt to place his finger upon his nose with his eyes closed failed, the finger frequently being carried up above the head or far to one side. When his eyes were closed he was absolutely unable to tell what position had

been given to his fingers or hand by the examiner. He did not know whether his hands were closed or opened. When his hand was placed in a position and he was requested to put the other hand in the same position, his eyes being shut, he was totally unable to do so. There was altogether a complete loss of muscular sense in the hand and wrist. At the same time his actual power was greater in the right hand than in the left; there was no disturbance whatever of tactile sense or the sensations of temperature and pain. There was no similar disturbance in the leg, and his gait was perfect; there was no affection of the face or the eyes. It was evident that the effect of the operation upon a spot in the brain about at the junction of the superior and inferior parietal convolutions, clearly posterior to the posterior central convolution, had resulted in a loss of muscular sense in the opposite hand and forearm without any disturbance of other sensations or of the power of movement.

This condition of ataxia remained stationary for about three weeks, and then gradually subsided. On April 10th, when he was last examined, no trace whatever remained, and the boy is practically well, being free from his old headache, feeling much brighter and more active, and having had no return of his attacks of epileptic nature.

TUBERCULOSIS OF THE FALLOPIAN TUBES.

(PRELIMINARY PAPER.)

BY CHARLES B. PENROSE, M.D.,

AND

H. D. BEYEA, M.D.,
OF PHILADELPHIA.

WE report the cases in this paper in detail, because we think that the frequency of genital tuberculosis in women is not generally recognized by the medical profession.

Much light has been thrown on that very large class of diseases called by the unscientific name of "pelvic inflammatory troubles" by the discovery of "unsuspected tuberculosis" of the Fallopian tubes, to which attention was first called by Williams, of Johns Hopkins Hospital.

The term unsuspected tuberculosis is applied to those cases of tuberculosis of the Fallopian tubes in which there is nothing in the objective symptoms and in the macroscopic appearance of the tubes, ovaries, or peritoneum to indicate the character of the disease. The tubes and ovaries present the same gross appearance which we see in more specific chronic salpingitis with adhesions; and it requires a microscopical and

bacteriological examination to determine that tuberculosis is the cause, or, at any rate, the accompaniment of the condition.

During the past winter we have made careful examination of all the Fallopian tubes which we have removed for any form of salpingitis. The total number of cases in which cœliotomy was done for salpingitis is twenty-five. In two of these cases the tuberculous character of the disease was manifest as soon as the abdomen was opened, from the presence of the tubercles upon the peritoneum of the tubes, uterus, intestines, etc. In three other cases the real nature of the disease was not suspected until a microscopical examination had been made of the tubes and the characteristic tubercular lesions and bacilli had been found. These three cases, therefore, belong to the class called unsuspected tuberculosis.

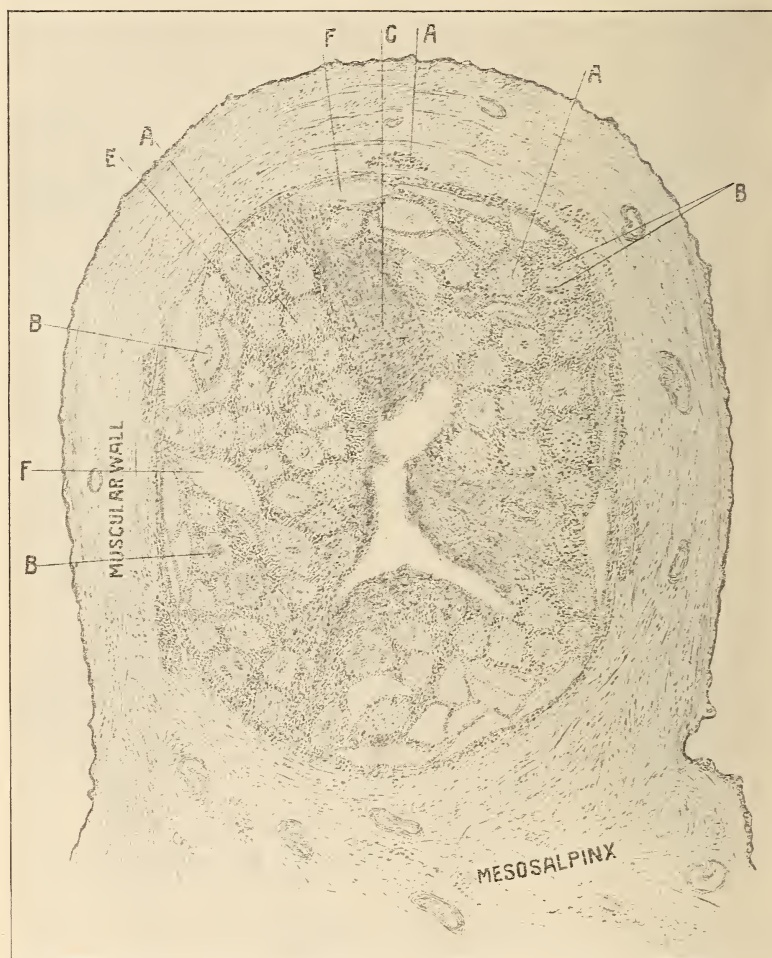
CASE I.—R. W., American, white, thirty-six years of age, single, dressmaker, admitted to the University Hospital, November, 1893. Menstruation first appeared in the twelfth year, and until January, 1893, was always regular, occurring every three weeks, and lasting usually two to three days. From January until March, 1893, she had almost continuous uterine hemorrhage (every two to three days), but from this time until the 1st of September she missed her menstrual periods. September 1st she began to flow again, and at times the hemorrhage was so severe that she was confined to her bed; *i. e.*, she would have a pronounced hemorrhage every three weeks and a slightly colored discharge in the interval. About the middle of April, 1893, she began to complain of pain in the left iliac fossa, back, and thigh, and from April 15th until June 5th she was confined to her bed with severe pain in the left iliac fossa. For three weeks before admission she had less pain and was much more comfortable. In May she had an attack of acute cystitis, complaining of pain in the hypogastric region, and frequent and painful micturition; but after a month's treatment these symptoms nearly disappeared, though she continued to be troubled occasionally with frequent and painful micturition, particularly at night. She had severe headache at times, and on admission to the hospital was very anæmic. There was a slight leucorrhœa; the bowels were regular. The patient had always been delicate and unable to do hard work of any kind. She had had the usual diseases of childhood, scarlet fever, pneumonia when ten years of age, and typhoid fever four years ago. When a child, until fourteen years of age, she was much troubled with a hacking cough. Family history: Father and mother living. Mother has cerebral softening; father healthy. Five sisters and four brothers living. Two brothers unhealthy—one suffering with Bright's disease and the other with cardiac disease. Sisters are all delicate, one having had white swelling and necrosis of the femur.

Vaginal examination showed enlargement of the uterus and a small cystic mass in the left ovarian region. The uterine appendages were adherent. Streptococci were found in the vaginal discharge preceding the operation.

Cœliotomy, performed on November 23d. A cyst the size of a baseball was found attached to the left ovary. Both tubes were closed, enlarged to the size of a small culture-tube, and universally adherent.

The uterus contained in its anterior wall a small submucous fibroid. Cyst, tubes, and ovaries were removed with considerable difficulty, the cyst being ruptured. Cover-glass preparations were made from the tube-contents during the operation, and no bacteria were found. No drain-

FIG. 1.



(CASE I.) A. Miliary tubercle. B. Giant-cell. C. Caseation. D. Abscess. E. Small round-cell infiltration. F. Cavities filled with degenerated pus.

age. Convalescence was uneventful, the temperature never going above 100° F., and being generally normal until December 6th, when the temperature rose to 102.6° F., the patient complaining of headache and feeling generally unwell. Blood was noticed in the urine several times after the operation, but no microscopical examination is recorded. The temperature remained irregular, with an evening rise and morning fall,

until February, when, on making a vaginal examination, an intra-uterine polyp, the size of a walnut, was found presenting through the external os. The polyp was removed, and convalescence proceeded without further symptoms until her discharge from the hospital, February 12th. The abdominal wound, after complete primary union, three weeks after operation, broke down, without marked suppuration, and healed very slowly by granulation. Examination of the blood December 4th, ten days after operation, showed the red blood-corpuscles to be reduced to 50 per cent.; hæmoglobin, to 45 per cent. January 4th: red blood-corpuscles, 80 per cent.; hæmoglobin, 75 per cent. February 5th: red blood-corpuscles, 95 per cent., and hæmoglobin, 70 per cent. She left the hospital greatly improved in health, the anæmia having nearly disappeared. A thorough physical examination of the chest was made several times during her treatment, with perfectly negative results, and no signs of tuberculosis were manifest anywhere.

Macroscopic Examination of Specimens. The specimens consisted of the tubes and ovaries from both sides, the cyst having been misplaced. The left tube was very tortuous, 10 cm. in length, and covered with dense adhesions destroying its peritoneum; it was generally enlarged, measuring 1.8-2 cm. in its outer third, 1.2 cm. in its middle third, and 1 cm. in its inner third. The abdominal ostium was closed. The tube was rather hard in consistence, and on section the muscular wall was seen to be greatly hypertrophied, particularly opposite to the attachment of the mesosalpinx, where in its outer third it measured 6 mm. The lumen was obliterated except in its outer third, where the tube was torn; here it contained a small amount of inspissated pus or caseous material. No signs of rugæ were noticed. Macroscopically no miliary tubercles could be seen either on the surface or in the sections. The mesosalpinx was completely obliterated, and the ovary was in immediate relation with the tube. The ovary had been considerably lacerated in its removal, and was covered with the same dense adhesions as the tube. It was soft in consistence and somewhat enlarged, measuring 5 x 4 cm. On section, few developing follicles were noticed. The right tube was about the same size and length as the left, covered with dense adhesions, was quite hard in consistence, but the tube lumen was intact. The abdominal ostium was closed, but had been extensively lacerated. The ovary was large and in every way similar to that of the opposite side. The mesosalpinx was also obliterated. No tubercles were detected either on the peritoneal surface of the tubes or ovaries or in making macroscopic sections. The polyp removed several weeks after the primary operation was the size of a walnut, very hard, and evidently fibroid in character.

Microscopic Examination of Specimens. Sections through the middle third of each tube show the entire mucous membrane to be infiltrated with innumerable miliary tubercles in all stages of development. The lumen of the right tube is patent, and the superficial mucous membrane shows marked caseation. A like condition presents itself on the left side, except that the lumen is obliterated in its inner two-thirds, and caseation is perhaps more marked. The greater number of the miliary tubercles present typical giant-cells, and many show beginning caseation; others are simple epithelioid-celled tubercles, giant-cells not having developed. Nowhere in the left tube, and only occasionally in the right tube, can the normal tubal columnar epithelium be found. Where columnar epithelium does exist it is always in relation with the muscular wall and

forms the wall of a cavity filled with partially degenerated pus. The greater number of tubercles are surrounded by an extensive small round-cell infiltration which is not infrequently converted into fibrous tissue. Just beneath the mucosa, separated from the muscular wall, and rarely in the muscular wall itself, very near its mucous-membrane margin, small multiple abscesses are sometimes seen surrounded by a marked small round-cell infiltration. The muscular wall is greatly hypertrophied and extensively infiltrated with small round cells. On the surface of both tubes and in all sections a chronic perisalpingitis is demonstrable. Sections through the outer ends of both tubes show caseation to be more marked, but otherwise do not differ from sections through the middle third. Sections made through the uterine ends show the process to be more acute, and almost no caseation can be seen. The tubercles have not reached the same degree of development as in other sections; one or more tubercles extensively surrounded by small round cells can be seen in the muscular wall, and most frequently opposite the attachment of the mesosalpinx. This condition is not found elsewhere. Small round-cell infiltration also seems to be generally more extensive in this portion of the tube. We, therefore, conclude that the disease began in the outer third of the tube. Sections made through the parovarium show the stroma to be intricately infiltrated with miliary tubercles, but caseation has not as yet taken place. The mesosalpinx contains a few tubercles, all being distant from the tube, the nearest being 5 cm. from its muscular wall. Both ovaries are about equally involved, the oöphoron and part of the paroöphoron being almost completely converted into tubercular tissue, and frequently large areas of caseation are seen. In many parts of the left ovary, in a single microscopic field a number of tubercles can be demonstrated in different stages of development, surrounded by small round cells which take the stain more deeply, and thus present a typical picture of tuberculosis. A large number of sections were stained for tubercle bacilli, and in several of these undoubted tubercle bacilli were found. Sections from the polyp show it to be a fibroid, but nothing characteristic of tuberculosis can be found on its surface. A few cover-glass preparations were made from the urine and vaginal discharge, but no bacilli were found. Although the tubercular infiltration extended to the uterine cornua on both sides, considering the fact that she had no symptoms, and at the time of discharge was rapidly improving in health, we conclude that the disease had not extended to the uterus. From the macroscopic appearances of these specimens we are quite positive in the opinion that tuberculosis could not have been suspected.

These specimens, therefore, present bilateral unsuspected miliary tubercular salpingitis, localized in the mucous membrane, except in the uterine end of the left tube, where tubercles infiltrate the muscular wall; chronic miliary tuberculosis of the ovaries, parovarium, and mesosalpinx, and a small submucous fibroid polyp of the uterus.

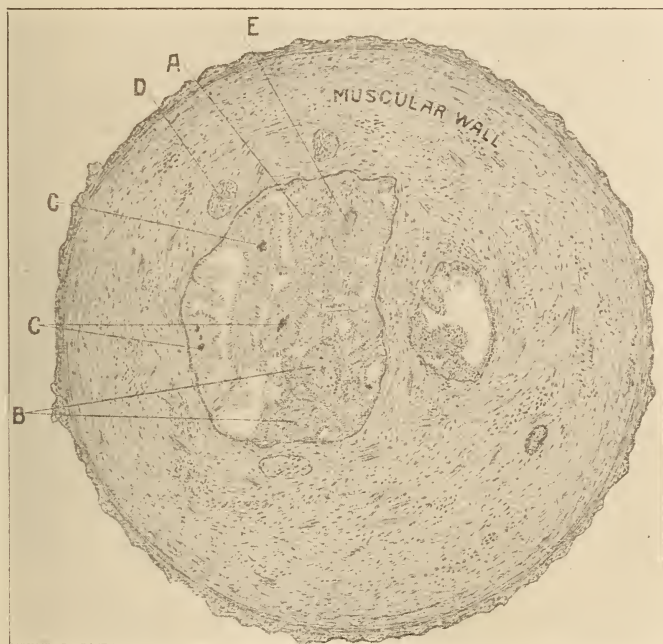
This woman is a very respectable person in whom we found no indication that sexual intercourse had been practised. This seems to be a case of primary chronic diffuse tuberculosis of the Fallopian tubes, the disease beginning in the outer parts of these structures.

CASE II.—E. R., American, white, twenty-three years of age, married sixteen months, nullipara, no miscarriages. Menses first appeared at

seventeen years, regular, usually lasting seven days, never profuse, but often painful and confining her to bed for a day. She now complains of pain in the left iliac fossa and back. Bowels are regular. Before the present trouble she had always been healthy, except when at fourteen years of age she had a disease diagnosed as gastric ulcer. The patient has lost much in flesh and strength, and now weighs ninety-two pounds. Family history is negative, except that a paternal aunt died of pulmonary tuberculosis. The symptoms were of such gradual appearance that she could not state when her sickness began. She was sick before marriage, and had become worse after marriage.

Patient's condition before operation: General physical weakness, backache, double ovarian pains.

FIG. 2.



(CASE II.) A. Epithelioid cell infiltration. B. Miliary tubercle. C. Calcification. D. Abscess. E. Giant-cell.

Vaginal examination showed retroflexed uterus, fundus adherent and small, very tender adherent tubes and ovaries.

Celiotomy, performed November 27, 1893. The uterus was found sharply retroflexed; the tubes and ovaries were bound down by dense, firm adhesions. The appendages were removed on both sides and the abdomen closed without drainage.

Convalescence was uninterrupted. She rapidly gained in flesh and strength, and now weighs one hundred and five pounds. She, however, complains of slight pain in the right iliac fossa. A thorough physical examination reveals no signs of tuberculosis.

Macroscopic Examination of Specimens. They consist of tube and ovary from both sides.

The left tube was 7.5 cm. in length, covered with dense adhesions; it was about normal in size, measuring 5 and 7 mm. in its various diameters; and on section was very hard in consistence. The lumen was generally very small, and in many places was almost obliterated and the tube converted into a musculo-fibrous cord. The abdominal ostium was closed and the mesosalpinx much shortened.

The right tube was 8 cm. in length, also covered with dense organized adhesions, and the abdominal ostium was closed. The outer two-thirds of the tube was the seat of an old hæmatosalpinx. On section, the tube was exceedingly hard in consistence, and in the sections through the hæmatosalpinx small areas of calcification were frequently noticed. In many instances in the uterine end of the tube the lumen was the size of a pin-point or head, and often, particularly as the hæmatosalpinx was approached, no lumen could be found. The tube measured from 5 mm. in its proximal two thirds to 9 and 13 mm. in its distal two-thirds. The mesosalpinx was obliterated. The ovaries were small, covered with a few adhesions, and were the seat of a marked hydrops folliculi. They measured 2.5, 3.5, and 4 cm. in their various diameters. Nothing suggestive of tuberculosis was noticed in the macroscopic examination of these specimens.

Microscopic Examination of Specimens. Sections through all portions of the left tube show a much thickened musculo-fibrous wall occasionally infiltrated with small round cells, and as the tube lumen is approached a small miliary tubercle or a minute area of epithelioid cells infiltrating between muscular fibres may be seen. Muscular tissue is still predominant, but the entire tube is characteristically fibrous, the tubercles often being surrounded by a very few small round cells and much fibrous tissue. The mucous membrane is almost entirely destroyed and the lumen edges are composed of fibrous tissue. Where a portion of the rugæ still exists, covered with intact columnar epithelium, the stroma is infiltrated with a miliary tubercle which rarely contains a giant-cell and never shows any signs of beginning caseation. A few small abscesses are seen in the tube wall just beneath the destroyed mucous membrane. The tube is tubercular throughout, the process being, perhaps, most extensive in its outer third, but extending to within 1 cm. of the proximal end, where no tubercular tissue can be found.

Sections through the uterine third of the right tube show a condition almost identical with that of the opposite side, except that frequently the tube lumen is completely obliterated by fibrous tissue, and at other times it is divided into two portions by a band of fibrous tissue running transversely across the section. As the hæmatosalpinx is approached, minute foci of calcification are noted. Sections through the outer two-thirds of this tube or hæmatosalpinx show the lumen filled with degenerated blood, in the centre of which are large areas of calcification. The walls of the tube are here very narrow and are composed of fibrous tissue with an occasional minute miliary tubercle and area of calcification.

Sections through the parovarium show a few miliary tubercles containing either a small giant-cell, or a focus of calcification, or they are composed wholly of epithelioid cells. Several sections made through each ovary show them to be chiefly composed of follicular cysts, but no tubercular tissue can be found. Although twenty sections were stained

for tubercle bacilli and carefully examined, none could be found. These specimens, therefore, present universal fibrous tubercular salpingitis with calcareous degeneration in the right tube and parovarium, a hæmatosalpinx of the outer two-thirds of the right tube and simple hydrops folliculi of both ovaries.

This case seems to be one of primary chronic fibroid tuberculosis of the Fallopian tubes.

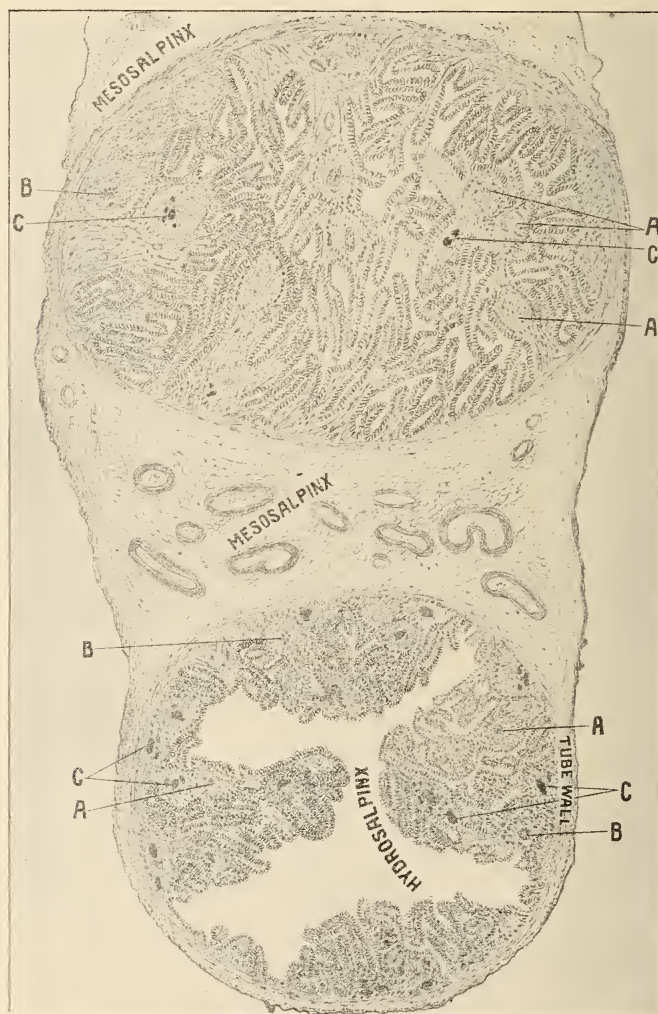
CASE III.—E. P., American, white, thirty years of age, married three years, housewife, nullipara, no miscarriages. Menstruation first appeared in her sixteenth year, and has always been regular, lasting three days, never painful or profuse. Her present trouble began eight years ago with pain in the right iliac fossa and back. For a month preceding the appearance of this pain she had a profuse vaginal discharge and complained of frequent and painful micturition. The pain in the right iliac fossa and back continued up to the time of operation, being paroxysmal in character. The bowels had been regular; no leucorrhœa or urinary symptoms. Temperature, pulse, and respiration since admittance to the hospital had been normal. The patient was a small and poorly nourished woman. She had a history of having had some hip-joint trouble on the right side when a child. When admitted there was no ankylosis of the hip, but there was marked flatness of the right buttock as compared with the left, and asymmetry of the right side of the pelvis. We believe that she had had tuberculosis of the right hip-joint. Mother and father are living and well; two cousins died of phthisis. Her husband is a slight, delicate man and has had a cough for the last three years. He denies having had venereal disease of any kind.

Vaginal examination showed a cystic mass lying to the right and behind the uterus, and a diagnosis of broad-ligament cyst was made.

Cœliotomy, January 16th. The omentum was found adherent, covering the pelvic contents. The large intestine was attached by dense adhesions to the superior surface of the right broad ligament. A cyst the size of a fetal head was found in the right iliac fossa, developing between the layers of the broad ligament and extending, adherent to all surrounding structures, to the hollow of the sacrum. It was enucleated with extreme difficulty, being ruptured in the procedure. About a pint of clear straw-colored fluid escaped from the cyst. On the left side the tube and ovary were much enlarged and generally adherent. The tube and ovary from the left side, and the cyst-wall and a mass of adhesions from the right side were removed. The right broad ligament was partially sutured. The site of the cyst was drained by a glass tube. Convalescence for ten days was uneventful, the temperature never going above 101.6° F., the drainage-tube being removed the second day following operation. January 26th the temperature became irregular, with an evening rise and morning fall, and she began to complain of pain externally over the right hip-joint and the internal anterior surface of the knee-joint. The temperature from January 26th to March 10th was irregular, sometimes remaining about normal for four or five days, and then running up to about 102° F. She had continually complained of pain as described, but, except for this, her condition was markedly improved, all pelvic symptoms having disappeared. Vaginal examination showed firm adhesions on the right side, and the uterus small and in normal

position. A thorough physical examination of the chest had several times been made with negative result, and we believe that no tubercular lesion exists in the lungs. When discharged from the hospital, at the end of March, her temperature was continuously normal, and there were no indications whatever of any pelvic or abdominal trouble, though she still complained of some pain in the right hip and knee.

FIG. 3.



(CASE III.) A, Miliary tubercle. B, Giant cell. C, Calcification.

Six weeks after discharge she returned to the hospital complaining of great pain in the right hip, general physical weakness, and progressive emaciation. - Vaginal examination was negative. There was no lateral

tenderness. There were firm adhesions in the region of the broad-ligament cyst. She had night-sweats, dry cough, and irregular temperature. There was marked pain on pressure and on motion in the right hip-joint. We believe that active tuberculosis, latent or perhaps absent since childhood, has been re established in the hip.

Macroscopic Examination of Specimens. The specimens consisted of tube and ovary from the left side and a mass of tissue from the right side composed of cyst-wall, a portion of a greatly lacerated and flattened ovary, the outer third of a tube, and a mass of old organized adhesions. The left tube was 11 cm. in length, greatly enlarged, particularly in its distal third, where it was dilated into a cyst, the abdominal ostium being closed. It was soft in consistence, appearing as a hydrosalpinx, and was covered with many dense adhesions, causing a partial constriction in its middle third. On section, a small amount of clear fluid escaped; and the lumen, except 5 cm. of its proximal end, was universally dilated, the dilatation being more marked as the abdominal ostium was approached, where it measured 1.2 cm. in diameter. The mucous membrane, except for the separation of rugæ, brought about through tubal dilatation, was apparently normal. The muscular wall was very thin, the maximum thickness being 1 mm. The tube was 1 and 1.8 cm. in diameter in the thinnest and thickest portions. The left ovary was 3.0, 3.5, and 4.5 cm. in its various diameters, covered with dense adhesions and the seat of a very marked hydrops folliculi. It contained a recent blood-clot 1.5 and 2 cm. in diameter. The mesosalpinx was completely obliterated and the ovary was in immediate relation with the tube. No miliary tubercles were noticed on the surface or in section of either tube or ovary. *Right side:* The remaining outer third of the tube, the remnant of ovarian tissue and the cyst-wall were enveloped and separated from each other by a mass of very dense adhesions. The tube was 3 cm. in length, 7 mm. in diameter, stony hard in consistence, and on section the lumen was obliterated. The inferior surface of the ovary was destroyed, and the cyst possibly had developed from its surface. It contained a large number of small follicular cysts. The cyst-wall was thin, smooth on its inner surface, and from its position nothing regarding its origin could be definitely ascertained.

Microscopic Examination of Specimens. *Left side:* Sections made through the proximal and middle thirds of the tube show chronic fibroid tuberculosis, localized wholly in the mucous membrane of a greatly dilated tube or hydrosalpinx. The mucous membrane rugæ are separated, and the stroma is at intervals infiltrated with a miliary tubercle or a few epithelioid cells. The miliary tubercle infiltration is distributed over areas separated by what would be normal mucous membrane except for considerable connective tissue hypertrophy and occasional slight small round-cell infiltration of the stroma; many microscopic fields can be seen without a single miliary tubercle or the least epithelioid-cell infiltration. The tubal columnar epithelium is completely intact in all portions of the section and in all sections. The miliary tubercles always infiltrate the mucous membrane stroma, and are very small as compared with those seen in Case I.; the greater number of the tubercles, perhaps nine-tenths, are composed simply of epithelioid cells; they take the stain very poorly, are characteristically fibrous, and are surrounded by exceptionally few small round cells. Giant-cells are remarkably few in number, and are also very small; never more than one

being found in a single tubercle, and none show beginning liquefaction necrosis. Occasionally, distributed over all portions of the mucous membrane but particularly as the muscular wall is approached, minute foci of calcification may be seen in a partly or completely destroyed miliary tubercle. The muscular wall is very much narrowed, muscular fibres are frequently infiltrated with fibrous tissue, but no tubercular tissue or small round-cell infiltration can be found in any section. The peritoneal covering of the tube is evidently destroyed, and its place is taken by an irregular layer of fibrous tissue. Sections through the outer portion of the middle third of the tube include a greatly enlarged parovarium which macroscopically resembles a tube, and is almost one-third larger than the tube itself, measuring 1.5 cm. in diameter. Microscopically the parovarium is infiltrated with fibroid miliary tubercles, localized in areas and presenting the same characteristics as those seen in the corresponding portion of the tube. The columnar epithelium is intact. Calcification is not so frequent as in the tube, but otherwise the disease is equally advanced. Sections from the abdominal third of the tube show dilatation much more marked, the muscular wall narrowed, and the lumen much larger than in other parts of the tube. The number of tubercles is greatly increased in this third of the tube, the stroma of the mucous membrane being much more extensively infiltrated with the same form of tubercular tissue. It is, therefore, noticeable that the tubercular process becomes continually more extensive as the abdominal ostium is reached. No areas of distinct caseation can be found anywhere. The mesosalpinx is not involved. Sections through the ovary show it to contain a large number of follicular cysts and a corpus luteum composed of degenerated blood, but nowhere in several sections made from this ovary can tubercular tissue be found. *Right side:* Sections through the remaining portion of the tube show the lumen almost obliterated, the mucous membrane destroyed, and the tube wall composed of fibrous tissue. Sections through the lacerated ovarian tissue show many follicular cysts and a few developing follicles. The cyst wall is composed of fibrous tissue, the lining cells, if any, having been destroyed. Fifteen sections from the left tube were stained for tubercle bacilli and three typical undoubted bacilli were found. All three bacilli were found in simple epithelioid tubercles.

These specimens, therefore, present chronic fibroid tubercular salpingitis, or hydrosalpinx, with calcification of the left tube, the disease being most marked in the distal third; chronic fibroid tuberculosis of a greatly enlarged parovarium, also with calcification, but less marked; chronic perisalpingitis and periovaritis of the left side; chronic inflammation and hydrops folliculi of both ovaries, most marked on the right side; chronic fibrous salpingitis and a cyst of unknown origin of the same side. That the specimens from the right side were primarily tubercular we cannot say, as nothing characteristic of tuberculosis was found; but since this disease frequently terminates in fibrous tissue, and the disease of the opposite side was of the fibroid form, we believe tuberculosis best explains the condition found. That tuberculosis could not have been suspected from the macroscopic appearances of these specimens we think is self-evident.

The case is probably one of secondary chronic fibroid tuberculosis of the Fallopian tubes, the primary lesion existing in the right hip-joint.

CASE IV.—Admitted to hospital March 30, 1894. Mrs. G., American, white, forty years of age; married; housewife; nullipara, no miscarriages. Menstruation first appeared when she was thirteen years of age, and until two months before her admission to the hospital had always been regular, lasting two to three days, and occurring every four weeks. It then became irregular, occurring every three weeks, and continued five to six days. One month before the change in menstruation she began to have pain in both iliac fossæ, and experienced bearing-down sensations. The pain became progressively more severe, and continued up to the time of operation, being most severe during the menstrual period and when in the recumbent position. She has been constipated for the past three months, or since the appearance of the first symptoms, and defecation has been associated with considerable pain and feeling of obstruction. She has never had leucorrhœa; there were no urinary symptoms. Temperature, pulse, and respiration for twenty-two days preceding operation were normal. The patient is a well-nourished woman, weighing about one hundred and twenty pounds, and, except for the diseases of childhood and dyspepsia several years ago, has been perfectly healthy. Her mother and father are living and well. Her husband is healthy. Two sisters died in confinement. Six sisters and one brother are living. One sister has a uterine fibroma and dyspepsia, and another has had a cough since childhood. The others are healthy. An uncle died of consumption.

A careful physical examination revealed no signs of tubercular trouble. Vaginal examination revealed a hard mass, about the size of a base-ball, behind and to the left of the uterus. The uterus was normal in size, and was adherent to the mass. Abdominal examination was negative.

Cœliotomy, April 20, 1894. The omentum and parietal peritoneum were seen to be occasionally studded with miliary tubercles, which were very small, transparent, and evidently of recent formation. The number of miliary tubercles progressively increased as the pelvis was reached, and were most numerous in relation with the site of the left uterine appendage. The omentum was adherent over the bladder and fundus of the uterus, the rectum adherent to the fundus of the uterus, and the vermiform appendix was attached by a strong band of adhesion to the right ovary. The right ovary and tube were apparently normal, the abdominal ostium of the tube being patent. The left ovary and tube were imbedded in a mass of adhesions behind the uterus. This mass was the size of a base-ball, quite as hard as a fibroid tumor in consistence; it completely filled Douglas' pouch, and extended, adherent to all surrounding structures, well down toward the left ischio-rectal fossa. The peritoneal cavity contained no fluid. It was quite evident that the disease originated in the left uterine appendage, as miliary tubercles were much more numerous on the left side, and in the pelvis they seemed to be larger in size and were here opaque. The mesenteric and pelvic lymphatic glands were but slightly, if at all, enlarged. The removal of the mass of tuberculous tissue was considered to be impossible, and, therefore, after irrigating with distilled water and introducing two strips of gauze to the floor of the pelvis as a means of drainage, the abdomen was closed. Convalescence was uninterrupted, the temperature, pulse, and respiration reaching normal on the fourth day after operation, and they have since continued normal and regular. Since

the operation the patient has complained of some soreness over the tract of drainage, pain in the left iliac fossa, and slight pain in defecation and micturition. Her appetite has improved; she has gained a little in weight and strength, and on leaving the hospital, one month after operation, believed herself well.

Macroscopic Examination of Specimen. The specimen was a small portion of the great omentum, removed for the purpose of microscopic examination. Its surface was studded with a few miliary tubercles, which were small, measuring 1 to $1\frac{1}{2}$ mm. in diameter, and transparent, and could scarcely be recognized with the naked eye. They were discrete, slightly raised above the surface, and separated from each other by 1 to 2.5 cm. of apparently normal peritoneum.

Microscopic Examination of Specimen. The miliary tubercles were separately excised, hardened in absolute alcohol, imbedded in celloidin, and stained with Delafield's hæmatoxylin and eosin. Each miliary tubercle is found to be composed of three, four, or six minute tubercles, the greater number of which contain a typical giant-cell, with an unusual number of central nuclei. The giant-cells are surrounded by a large number of epithelioid cells, a small amount of connective tissue, and a few small round cells. No tubercle bacilli are found, yet the tissue described could only be characteristic of tuberculosis.

Since the miliary tubercles were discrete and transparent, the giant-cell nuclei numerous and always occupying the centre of the cell, and the connective tissue and small round-cell infiltration not marked, we conclude that the peritonitis must have been in an early formative stage and of short duration. Although microscopic examination of the left Fallopian tube was impossible, yet from the macroscopic appearance during the operation, considering the fact that it was very hard in consistency, and covered with dense fibrous adhesions, that the developing peritonitis was of undoubted tuberculous origin, as shown by microscopic examination, and that the mesenteric and pelvic lymphatic glands were not enlarged, and no other tubercular lesion could be found, we believe it evident that this case represents an instance of primary tuberculosis of the female genital organs, most probably of the left Fallopian tube, with secondary tubercular infection of the peritoneum.

CASE V.—M. H., American, white, thirty years of age, married six years, tailoress; nullipara, no miscarriages. Menstruation first appeared in her sixteenth year, and has always been regular, lasting three to four days, but usually preceded by pain. Six and a half years ago, while working hard on a farm, she first noticed that she was losing in flesh and strength, and six years ago, or immediately after her marriage, without any apparent cause, she began to have pain in the right iliac fossa and back, referred down the right thigh. The pain was always worse during the menstrual period, and, with a gradual loss of flesh and strength, increased somewhat in intensity, although it was never very severe until her admission to the University Hospital, May 1, 1894. She has had leucorrhœa for many years. She is usually constipated, and is sometimes troubled with painful micturition. On admission to the hospital she was anæmic, and complained of pain as described. Temperature 99° F., pulse 80, respirations 22. She has had the usual diseases of childhood, including scarlet fever and a mild attack of pleurisy about six years ago, but otherwise has been perfectly healthy and able to do hard work, either on a farm or at her trade. Father and

mother are living and well. One brother died of typhoid fever. Four sisters and two brothers are living—one brother now has consumption, the others are healthy. Her husband is apparently healthy.

On vaginal examination the uterus was found small and retroflexed, the right ovary enlarged and adherent to the right uterine cornu.

Cœliotomy, May 4, 1894. The omentum was adherent to the parietal peritoneum on the right side of the abdominal incision. The intestines, omentum, parietal peritoneum, broad ligaments, bladder, and uterus were seen to be uniformly studded with numerous discrete opaque or transparent miliary tubercles about the size of a millet-seed, evidently of recent formation. The peritoneal cavity contained no fluid. The right tube and ovary were found covered with dense adhesions and miliary tubercles, and adherent to all surrounding structures. The left broad ligament was very short and inclined downward. The left tube was small, almost uniform in diameter from the proximal to the distal end, and terminated very near the pelvic wall in a closed end. In the operation it was necessary to include the distal portion of the tube in the ligature of the ovarian artery; no left ovary could be found. There were no signs of inflammation on the left side of the pelvis. There seems to have been congenital absence of the ovary with malformation of the tube. The right ovary and tube were dissected away with considerable difficulty, and removed with the uterus and part of the left tube. The abdominal cavity was closed without irrigation or drainage. Although convalescence was slow it was uneventful, except that the temperature reached 102.4° F. on the third day following the operation, and remained continually and regularly high until the ninth day, when it reached normal, but has been somewhat irregular since. The pulse remained about normal, the greatest rapidity being 90, when the temperature was 102.4° F. The patient left her bed at the end of the third week. She still complains of some pain in the right iliac fossa and back, but is otherwise slowly improving. Examination of the blood three weeks after operation showed the number of red blood corpuscles to be 95 per cent. and the hæmoglobin to be 70 per cent. A thorough physical examination revealed a small area of impaired percussion-resonance over the base of the right lung, the probable result of an old pleurisy, but no signs of tuberculosis could be found anywhere.

Macroscopic Examination of Specimens. The specimens consisted of the tube and ovary from the right side, the fundus and supra-vaginal portion of the cervix of the uterus, and a portion of the left tube. All specimens and all portions of each specimen were covered with numerous miliary tubercles, which were generally somewhat larger than a millet-seed, and transparent or opaque. The right tube was 9 cm. in length, and covered with dense adhesions. The fimbriated extremity was lacerated, the abdominal ostium closed, and no signs of fimbria could be seen. The distal two-thirds was very much enlarged, measuring 1, 1.5, and 2 cm. in diameter, almost stony hard in consistence, and seemed to be composed of nodules or tubercles the size of a pea. The enlargement began almost abruptly at the junction of the middle and proximal thirds, and gradually increased as the fimbriated extremity was reached. The proximal third of the tube was of uniform and normal size, measuring 5 cm. in diameter, and was also very hard in consistence. On section, the distal two-thirds was seen to be composed of fibrous tissues arranged in the form of nodules or tubercles; the tube was patulous in the middle

third, the proximal half of which contained a small amount of inspissated pus or caseous material, and the distal half a small focus of coagulated blood. The lumen was obliterated in the distal third. The proximal third of the tube showed nothing abnormal except that the muscular wall was unusually resisting. The lumen was very small, but patent. No tubercles showed any signs of caseation, and no caseation was seen except in the lumen of the proximal half of the middle third. It was evident from the macroscopic appearances of the distal two-thirds of this tube that it was the seat of chronic fibroid tuberculosis. The mesosalpinx was but little shortened, covered with a few dense adhesions in relation with the tube, and contained a nodule 1.5 cm. in length which could be rolled between the fingers, and was considered to be an enlarged parovarium. The ovary was enlarged, measuring 4, 3.5, and 2 cm. in its various diameters, rather soft in consistence, covered with a few dense adhesions on its inferior surface, and was the seat of an extensive hydrops folliculi, many of the cysts containing blood. The uterus was very small, measuring 5 cm. in length, 5 cm. in breadth at the fundus, and 3.5 cm. at the cervix. Its peritoneal surface, except for miliary tubercles, was smooth and normal. The fundus was of about normal consistence, and the cervix hard and resisting. On section, the muscular wall appeared normal, the uterine mucous membrane was hemorrhagic, distinctly thickened, measuring 4 and 5 cm. in various portions of the fundus, and numerous minute tubercles could be seen and felt slightly raised above the surface. The Nabothian glands were prominent. The entire mucous membrane was the seat of a very chronic endometritis. The remaining portion of the left tube was 3 cm. in length, 5 cm. in diameter, abnormally hard in consistency, and its lumen, though exceedingly small, was patent.

Microscopic Examination of Specimens. *Right side:* Sections made through the *distal two-thirds* show chronic fibroid tuberculosis involving and almost completely destroying the mucous membrane, and infiltrating and distorting the muscular wall at short intervals. The disease is most extensive toward the centre of the tube, and becomes less and less marked as the destroyed peritoneal surface is approached. The mucous-membrane stroma in the distal third of the tube has been destroyed and replaced by tubercular tissue; and only occasionally, and always in relation with the muscular wall, can mucous-membrane stroma surrounded by its columnar epithelial cells be seen. The areas of this partially diseased stroma become more frequent toward the proximal third of the tube. A few fibres of stroma are very often seen separated and surrounded by tubercular tissue away from the muscular wall and in the centre of the tube in all sections. The columnar epithelial cells are always small in size, and are not only seen in relation with the muscular wall, but also partially or completely surrounded by miliary tubercles, or they appear as the end of a separated ruga in the centre of the tube. Where mucous membrane stroma still exists surrounded by its columnar epithelium, it forms the walls of numerous cavities containing either degenerated blood or a small amount of inspissated pus. The miliary tubercles are almost entirely composed of epithelial cells, which take the hæmatoxylin stain unusually poorly. The tubercular tissue is not only found as distinct miliary tubercles, but more frequently epithelioid cells and a few small round cells replace the stroma of a completely or partially destroyed ruga, separated from like

rugæ by a few columnar epithelial cells. The small round-cell infiltration is exceedingly small in amount, is not arranged around tubercles, but is uniformly distributed in every part of the tubercular tissue. Considerable fibrous tissue can be seen surrounding each tubercle and infiltrating tubercular tissue. Giant-cells are very rarely seen, the greater number of tubercles being composed of simple epithelioid cells and a few small round cells. The giant cells are very large, occupying the greater part of the tubercle, and usually contain many central nuclei. They are most frequently seen in tubercles near or just within the muscular wall. One or two minute foci of calcification may be seen in every section. Sections through the *middle third* of the tube show the lumen to be present and its edges composed of tissue undergoing caseation. The lumen is largest in the distal half of the middle third of the tube and contains a small amount of blood. In the proximal half of the middle third the lumen is partially filled with inspissated pus or caseous material. The lumen is entirely obliterated in the distal third of the tube. The tube wall is very much hypertrophied, particularly in the distal third. It is the seat of an extensive and irregularly distributed small round-cell infiltration, and frequently, particularly near the mucous membrane edge, a large miliary tubercle is seen, surrounded by numerous small round cells. The most pronounced tubercular infiltration of the tube-wall is seen in the middle third, and here also an occasional large area of caseation with beginning liquefaction necrosis can be seen. These areas of caseation are very near the surface of the tube, and are covered with a thin layer of fibrous tissue. It therefore seems very probable that the peritoneum was infected from the middle third of the tube. The *proximal third* of the tube: Sections through this portion of the tube show the mucous membrane to be infiltrated with a few miliary tubercles, surrounded by and containing distinctly more small round cells than those of the distal two-thirds of the tube, but as the proximal half of this third is approached, all tubercular tissue disappears and only the least amount of small round-cell infiltration can be seen. In other words, the tube is almost normal in the half toward the uterine cornu.

Small round-cell infiltration is frequent in the tube-wall toward the middle third of the tube, but contains no tubercular tissue. The tubercular disease is, therefore, almost wholly localized to the distal two-thirds of this tube. Sections made through the middle third of the tube include the parovarium, mesosalpinx, and a small portion of ovarian tissue. The parovarium is enlarged, and the stroma is in many places infiltrated with fibroid miliary tubercles having the same characteristics as those seen in the corresponding portions of the tube, except that small round-cell infiltration is much more marked. Much of the parovarium stroma is normal, and surrounded by intact columnar epithelial cells, the tubercular disease being limited to small areas. The mesosalpinx, except for a slight small round-cell infiltration in that portion near the tube, and an occasional acute miliary tubercle and a small amount of fibrous tissue on its surface, is normal. No miliary tubercles can be seen in the mesosalpinx.

The portion of *ovarian tissue* is normal. Several sections made through the ovary show it to be covered with a capsule of dense fibrous tissue. The oöphoron contains a large number of small cysts, many of which are filled with degenerated blood—hydrops folliculi. One section shows a single acute miliary tubercle on the surface of the ovary,

but otherwise no tubercular tissue can be found anywhere in any section. Thus, the ovary is not included in the primary tubercular process.

Left side: Sections made through the remaining 3 cm. of the tube show nothing abnormal.

The uterus: Sections were made through its entire length from the supra-vaginal portion of the cervix to the peritoneal surface at the fundus, including endometrium, muscular wall, and peritoneal covering. Some were made in relation with each cornu. These show the endometrium to be much thickened because of a chronic glandular endometritis, and frequently in that portion toward the fundus, and particularly in each uterine cornu, small areas of miliary tubercular infiltration are seen. The infiltration always involves the superficial portion of the endometrium; it is localized to small areas composed of one or two, to six, minute miliary tubercles very extensively surrounded by a small round-cell infiltration. These tubercular areas become larger and more frequent toward the fundus, and particularly in the right uterine cornu. In the endometrium, away from the fundus, they are small, composed of a single miliary tubercle surrounded by an extensive small round-cell infiltration, and none can be found in the lower half and cervix. The small round-cell infiltration is so very extensive that it is easily recognized; where no tubercles seem to exist an area of small round-cell infiltration is often demonstrable. An excessive number of small round cells and no inter-cellular substance is seen. The miliary tubercles, except for the extensive small round-cell infiltration, do not seem to differ from those seen in the right tube. Giant-cells are not more frequent, and have the same characteristics. No caseation or calcification can be seen. Sections made transversely across each uterine cornu show the disease occasionally infiltrating the endometrium as a single miliary tubercle, but as the tube is approached they disappear. Miliary tubercles are more frequently seen in sections in relation with and through the right uterine cornu than in those through the left cornu. The glandular spaces throughout the endometrium are abnormally large, and the gland-cells are very often separated or have entirely disappeared. The stroma, except where miliary tubercles exist, is small in amount, the endometrium being mostly composed of partially destroyed utricular glands. The Nabothian glands are very large, and filled with a material which takes the stain poorly. The muscular wall and peritoneal covering seem normal. None of the sections included an acute miliary tubercle.

The uterus, therefore, shows chronic glandular corporeal endometritis and chronic cervical endometritis, with discrete miliary tubercular (most probably fibroid in character) infiltration of the upper half of the corporeal endometrium; also that the tubercular infiltration was most extensive in relation with the uterine cornua, particularly the right; that it becomes less frequent toward, and entirely disappeared in, the lower half of the corporeal endometrium, and that it also disappeared within each uterine cornu. That the endometrium was secondarily infected from the distal two-thirds of the right tube is beyond doubt, since the disease in these portions of the tube was more extensive, was chronic, and the lumen contained caseous material. Six sections made through the distal two-thirds of the tube were stained for tubercle bacilli and five typical bacilli were found. The fact that the disease of the right tube was almost entirely localized to its distal two-thirds is of particular interest, showing that primary infection, as is believed by all

observers, must have taken place in this portion of the tube, and, because of the normal more intricate folding of the mucous membrane, thus affording better conditions and protection for the growth of the tubercle bacillus. Why the proximal third of the tube was not secondarily more extensively affected we do not know; but this fact, with the secondary infection of the endometrium, which infection disappeared within the uterine cornua, demonstrates that, although sections through the last centimetre of the uterine end of the tube show no tubercular infiltration, the endometrium may be the seat of secondary infection. From the macroscopic and microscopic examinations of these specimens showing a very chronic and extensive form of fibroid tuberculosis of the right tube, and from the more extensive fibroid tubercular infiltration and areas of caseation in the wall of the middle third of the tube, we believe that the peritoneum was secondarily infected from this portion of the right tube.

These specimens, therefore, present: Chronic primary fibroid tubercular salpingitis, with calcification, of the right tube, the disease being almost wholly localized in the distal two-thirds; chronic secondary fibroid tuberculosis of an enlarged parovarium; chronic perisalpingitis of the right side; chronic inflammation and hydrops folliculi of a single (right) ovary; secondary fibroid tuberculosis of the upper half of the uterine endometrium, with chronic glandular corporeal endometritis and chronic cervical endometritis; and acute secondary tubercular peritonitis.

In none of the cases here reported was tuberculosis suspected. In the last two cases the condition was recognized as soon as the peritoneum was opened. In the first three cases the condition was impossible to recognize until the specimens removed had been subjected to microscopic examination. Without this examination the cases would have gone on record with the usual diagnosis of "adherent tubes and ovaries."

Cases I., II., and IV. seem to belong to the class of primary tuberculosis of the tubes, since no tubercular lesion could be found elsewhere; there was no history of any previous tubercular trouble; and in I. and II. marked improvement in the general health followed the operation.

In Case III. we believe the tubal trouble to be secondary to old tubercular disease of the hip.

In Case V. there is some little doubt about the primary character of the tubal tuberculosis, on account of the history of pleurisy, and from the fact that examination of the chest was not altogether negative.

There was nothing in the symptoms presented by any of the cases to indicate that tuberculosis of the tubes or of the peritoneum existed; nor was anything elicited by a bimanual examination of the pelvis which enabled us to make a diagnosis other than that of adherent tubes and ovaries. When tubercles exist on the peritoneum of the fundus and posterior surface of the uterus, we believe that a diagnosis can be made by dragging down the uterus with a tenaculum and examining per rectum. If this method of examination had been followed in Case V. we feel confident that tuberculosis could have been diagnosticated.

One point which strikes us in reviewing the histories of these cases is that all the women had been sterile, though four were married. In this respect these histories differ from those of ordinary cases of non-tubercular salpingitis, where in the great majority there is a history of at least one child or miscarriage before the disease reaches such a stage as to render the woman sterile.

The account of the beginning of the disease is too vague in all the cases for us to determine the time with any degree of certainty. From the fact of sterility, however, we conclude that tubal disease existed before marriage, either as tubercular or as a preceding inflammatory condition. We cannot determine certainly in any case whether tuberculosis existed primarily, or whether tuberculosis was grafted upon a pre-existing salpingitis. We think, however, that tuberculosis was the primary tubal lesion, at least, in the cases of the married women.

The common causes of non-tubercular salpingitis occur after marriage—sepsis and gonorrhœa; and in the disease from each of these causes one or more pregnancies may occur. No such history, however, is given by the cases which we have reported. Sterility existed from the beginning, and the disease seems to have antedated marriage.

We have stated that the five cases reported were found in a series of twenty-five cœliotomies for pelvic inflammatory trouble. Therefore, our results show that about 20 per cent. of such cases are tubercular in character, and that 12 per cent. of them belong to the class of cases called unsuspected tuberculosis of the Fallopian tubes. The total number of cases is too small to warrant the conclusion that 20 per cent. represents at all accurately the proportion of tubercular to non-tubercular cases of salpingitis. We believe that it is the largest per cent. which has been recorded; Williams reports 7.7 per cent. of tuberculosis in ninety-one cases of perisalpingo-oöphoritis.

From a pathological standpoint these cases are divided into: First. Primary chronic diffuse tubercular salpingitis (Case I.). Second. Primary chronic fibroid tubercular salpingitis with calcification (Case II.). Third. Secondary tubercular peritonitis, the primary lesion being in the Fallopian tube (Cases IV. and V.). Fourth. Secondary chronic fibroid tubercular salpingitis with calcification (Case III.). The characteristics of the first are that the mucous membrane is partially or completely replaced by innumerable miliary turbercles surrounded by an extensive small round-cell infiltration, and that large areas of caseation are very frequently seen. Caseation becomes more marked as the lumen and the distal two-thirds of the tube are approached. The muscular wall of the tube may be infiltrated to a greater or less degree. This form would represent tubercular pyosalpinx. The second form differs from the first in that considerable fibrous tissue is seen within and around the tubercles, and that small round-cell infiltration is very small

in amount and uniformly distributed in all parts of the tubercular tissue; also, that caseation is very rarely seen or is absent, and calcification very frequently occurs. The disease in this form may be limited to a portion of the tube, as in Case V. The characteristics of the third form are apparent and well known. The fourth form does not differ pathologically from the second. The specimens from four of the cases consisted of one or both tubes and ovaries, and in one case the uterus. In two of the four cases the tubercular salpingitis was bilateral. The ovaries were involved by the tubercular process in only one case. In the only instance where the uterus constituted part of the specimens it was the seat of chronic fibroid tubercular endometritis. This form of tubercular disease of the uterus is mentioned as being possible by Williams, but he reports no case. In all four cases the parovarium was affected by the tubercular process. As far as we can learn, tuberculosis of the parovarium has never been mentioned. As regards these four cases, the order of frequency of tuberculosis in the female genital tract is as follows: tubes, parovarium, uterus, ovaries. Case V. is interesting in that the peritoneum was infected from a chronic fibroid tubercular salpingitis, giving an instance where this form of tuberculosis was not a conservative process. Considering the frequency of unsuspected and suspected primary tuberculosis of the female genital tract and its termination in tubercular peritonitis, as shown by Williams and in this paper, it seems to us very probable that tubercular peritonitis in women has its origin in the female genital tract far more frequently than statistics show and is generally supposed. Should all organs found to be tubercular at autopsies on women dying of tubercular peritonitis be subjected to microscopic examination, thus determining which one of the lesions were the more chronic, we believe much would be learned.

THE NATURE AND TREATMENT OF LEPROSY.¹

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ALTHOUGH it has been confounded with many affections of the skin, and known by a variety of names, history teaches that, since Moses wrote of "the laws and tokens whereby the priest is to be guided in discerning the leprosy," this vile disease, this unclean scourge has appeared, in a greater or lesser degree, among all nations and conditions of people—mid polar snows and equatorial sands; from the Orient unto the Occident.

It is not, however, the purpose of this paper to enter into minute historical detail, nor to trace the dissemination of leprosy down through

¹ Awarded the Alvarenga Prize for 1892, by the Philadelphia College of Physicians.

succeeding ages—for it is well known that, from about the beginning of the Christian era to the end of the sixteenth century, it had overrun all Europe, and that before the end of the seventeenth it had been almost wholly eradicated from among the more civilized portions of that continent; its intent will have been subserved if the writer can, from the observations of other competent, painstaking investigators, coupled with his own, cast even a modicum of light upon the nature of a disease whose terrible ravages in times past dethroned kings and made social and political exiles of rulers, prelates, and subjects—a disease the mention of which even yet suffices to create consternation in the stoutest hearts.

At the present time—notwithstanding the fact that no disease was ever regarded with equal abhorrence; notwithstanding that it was once almost entirely exterminated; notwithstanding the rapid advances in civilization, in the arts, and in the sciences; and notwithstanding the earnest efforts, in all ages, of hundreds of noble, self-sacrificing men and women, in and out of the medical profession—it is a lamentable fact, one that should mantle humanity's cheek with the blush of deepest shame, that leprosy exists, throughout the civilized as well as the uncivilized world, as an endemic disease; prevailing as such, however, more extensively in France, Spain, Portugal, Norway, Sweden, Italy, Greece, Russia, China, Asia, Africa, the islands of the Indian and Pacific Oceans, Japan, New Zealand, Australia, Madeira, the West Indies, Central and South America, Cuba, Mexico, the Hawaiian Islands, New Brunswick, and some portions of the United States.

Hansen's discovery, that a particular bacillus is invariably associated with leprosy, has been abundantly confirmed from every quarter of the globe. Thus, Mitra,¹ Rake,² Donovan,³ Kaurin,⁴ Arning,⁵ Hellat,⁶ Goldschmidt,⁷ Cornil and Babès,⁸ Wheeler,⁹ Morrow,¹⁰ Boinet,¹¹ Thoma,¹² Cantlie,¹³ Bouchard,¹⁴ Bourns,¹⁵ Manson,¹⁶ Stullard,¹⁷ Olavide,¹⁸ Gibbs,¹⁹ Dock,²⁰ Chacon,²¹ Looft,²² and a host of other investigators whose writings have been consulted and whose names might be cited, men who have studied leprosy from every standpoint, unite in the opinion that the *bacillus lepræ* is always present in leprosy, and is its specific cause.

From the enormous quantities of the bacilli always present in leprosy tissues, more especially after the process of tuberculization has com-

¹ AMER. JOURN. MED. SCI., July, 1891.

² Journ. Lepr. Invest. Com., No. II.

³ Arch. f. Derm. und Syph., January, 1891.

⁴ Ibid.

⁵ Journ. Lepr. Invest. Com., No. II.

⁶ Rev. de Méd., 1890.

⁷ Brit. Med. Journ., May 4, 1891.

⁸ Intern. Med. An., 1891.

⁹ Brit. Med. Journ., Dec. 21, 1889.

¹⁰ Pract. Path. and Morb. Hist.

¹¹ Gac. Med. Mex., Nos. III. and IV.

¹² London Lancet, January, 1892.

¹³ Ibid.

¹⁴ Journ. Lepr. Invest. Com., No. IV.

¹⁵ Les Bactéries.

¹⁶ Journ. Cut. and Gen.-Ur. Dis., Jan., '90.

¹⁷ Deutsche Arch. f. klin. Med., 1890-91.

¹⁸ Enfer. Infec.

¹⁹ Journ. Lepr. Invest. Com., No. I.

²⁰ Rev. Cl. de los Hosp., Dec., 1889.

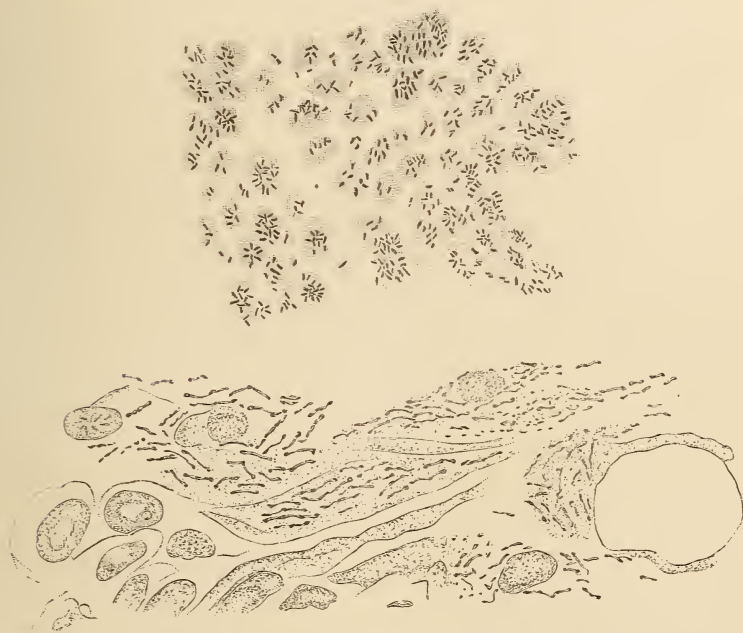
²¹ Trans. Tex. State Assoc., 1889.

²² Centr. f. d. Med., 1891.

menced, Cornil and Babès think leprosy the most classical type of bacterial diseases. They say :¹ " Bien que le contrôle de l'expérimentation nous fosse défaut, les bacilles sont tellement nombreux dans toutes les cellules lèpreuses et dans toutes les lésions de la lèpre, depuis le début des tubercules et pendant toute leur durée, les lésions sont tellement inséparables des bacilles, qu'il est évident que la lèpre est le type le plus net des maladies bactériennes."

The writer has examined thirty cases of tubercular and five cases of macular leprosy, with reference to the presence of bacilli, and has never failed to find them in sections of tubercles, in blood drawn directly therefrom, in discharges from leprosy ulcers, and, occasionally, in the sputum and the secretions from the nose; but he has never found them in the feces, urine, or blood, only when the latter was taken directly from a tubercle, although other investigators—Köbner, according to Thoma,² and Cantlie³—claim to have found them in the blood-current.

FIG. 1.



Leprosy bacilli. (After CORNIL and BABÈS.)

The bacilli were plentiful in the sputum and nasal secretions of the subjects of photos Figs. 4, 6, and 8. They were also found in discharges from ulcers in the same subjects, and in a section of skin from the macular spot on the left arm of the subject of Fig. 3.

¹ Loc. cit.² Loc. cit.³ Loc. cit.

Fig. 1 is a fairly good representation of lepra bacilli as seen in the skin of lepers. It is copied from Cornil and Babès' *Les Bactéries*.

Thin,¹ Tache,² Münch,³ Hellat,⁴ Sir William Moore,⁵ White,⁶ Cayley,⁷ and, indeed, with one or two notable exceptions, nearly every author whose work the writer has been able to consult, agree—for there seems to be a more general consensus on this point—that, aside from the enervating influences of such environments on the one hand, or their tendencies to physical well-being on the other, and which apply with equal force to all ailments, the origin and spread of leprosy is neither dependent upon nor affected by race, climate, altitude, occupation, food, dwelling, or economical, social, or political conditions.

The opinions of these eminent gentlemen are in strict accord with the writer's experience in Mexico. He has seen the disease, as an endemic one, on the shores of the Mexican Gulf, and high up in the Sierra Madre mountains; in wet, marshy districts, and on dry, *buena vista* tablelands; in its hot, sultry, southern climate, and in its even, temperate, northern exposure; in the palaces of its hidalgos, and in the *jacales* of its peons—among all classes and occupations of its people; but it is more prevalent among the poor than the rich, doubtless because the former class largely predominate and is less mindful of personal hygiene and other protective measures.

As prominent among those not in entire accord with the views above stated, Mr. Jonathan Hutchinson,⁸ Francis,⁹ Roussel,¹⁰ Thoma,¹¹ and Ashmead¹² may be mentioned. Mr. Hutchinson contends "that in all former ages when leprosy was prevalent, and in all the various lands where it is now still found, it has had, and still has, one and the same cause—being the taking into the system, in the form of fish food, the poisonous germs of the malady; . . . that the advance of Christianity, with its salt-fish feasts, and not the Crusades, was mainly conducive to the general spread of the disease in Europe during the Middle Ages; that its spreading is always due to food, and never to contagion."

According to his idea, it is not necessary to consume large quantities of fish—a small fragment being sufficient, if containing the bacillus—in order to introduce the germ directly into the stomach and produce the disease. He writes, *loc. cit.*: "It may be by direct introduction of the bacillus into the stomach," or "it may be that some element in fish food rouses into activity a bacillus already existing in the tissues. The first is the more probable supposition, and if it be true, it is obvious that very small quantities of fish, if containing the bacillus, may be efficient to

¹ London Lancet, January 16, 1892.

³ Ibid.

⁵ Journ. Lepr. Invest. Com., No. I.

⁷ Journ. Lepr. Invest. Com., No. I.

⁹ Ibid.

¹¹ Loc. cit.

² Journ. Lepr. Invest. Com., No. III.

⁴ Journ. Lepr. Invest. Com., No. IV.

⁶ Int. Ency. Surg., Ashhurst.

⁸ Journ. Lepr. Invest. Com., No. I.

¹⁰ Journ. Lepr. Invest. Com., No. II.

¹² Journ. Cut. and Gen.-Ur. Dis., vol. viii.

produce the disease," and "that the development of the parasite is further favored by a diet of fish. Thus the greater severity and rapidity of the disease in countries where it is endemic, and the fewness of recoveries there, may be explained."

Francis accuses unsound vegetables; Roussel sees in fish diet a cause—Thoma, bad fish and insanitary conditions—that may facilitate its transference, while Ashmead recognizes the Japanese custom of eating raw fish as having value in defining the etiology of leprosy. These gentlemen, with Mr. Hutchinson, are, perhaps, the best-known exponents of the "intermediary host" theory of the transmission of leprosy.

That race plays no part in the cause of leprosy is evidenced by the fact of its occurring among all races; that climate does not, by its presence in all climates; that altitude does not, by the fact that it exists down by the seashore and up on the mountain-tops; that occupation does not, for the reason that persons of all vocations have it; that food does not, because found among those eating every variety of food; that dwellings do not, by its visits to palace and hovel; that economical conditions do not, by its ravages among the rich and the poor; that social and political conditions do not, by its attacking both ruler and subject; that fish-eating does not, by its infesting semi-desert districts where fish is unknown; that meat of no kind does, by vegetarians having leprosy; and that vegetables do not, by meat-eaters not escaping it.

Mitra,¹ Castor,² Pacha,³ Blanc,⁴ Hood,⁵ Goldschmidt,⁶ Koch,⁷ Navarro,⁸ Wheeler,⁹ Hicks,¹⁰ Moore,¹¹ Manson,¹² Murray,¹³ Francis,¹⁴ Phillippo,¹⁵ Danielssen,¹⁶ Macnamara,¹⁷ White,¹⁸ Boinet,¹⁹ Chacon,²⁰ Lovell,²¹ Boeck,²² and many others, regard heredity as potent in the etiology of leprosy. Of eighty cases examined by Boinet, with regard to heredity, fifteen cases were undoubtedly due to this cause; nevertheless, while admitting these figures to be inadequate, since lepers do not readily acknowledge heredity, Boinet does not attach a great deal of importance to heredity as a cause, believing that many cases regarded as hereditary are merely examples of "heredo-contagion."

Navarro,²³ a man of forty years' experience with lepra in Vélez, reports that in 1847 he delivered a woman of a male child covered with leprosy spots over the whole cutaneous surface; that in two months leprosy tubercles developed on the child's face, elbows, and knees; that the

¹ Loc. cit.

² Voyages chez les Léproux.

³ Ibid.

⁴ Journ. Lepr. Invest. Com., No. IV.

⁵ Journ. Lepr. Invest. Com., No. II.

⁶ Loc. cit. ¹² Ibid.

⁷ Ibid. ¹⁵ Ibid.

⁸ Brit. Med. Journ., Dec. 28, 1889.

⁹ Rev. de Méd., August, 1890.

¹⁰ Journ. Lepr. Invest. Com., No. II.

¹¹ Rev. de Méd., August, 1890.

² Journ. Lepr. Invest. Com., No. II.

⁴ Journ. Lepr. Invest. Com., No. II.

⁶ Loc. cit.

⁸ Rev. Méd. Bogotá, Nov., 1890.

¹⁰ Ibid.

¹³ Journ. Lepr. Invest. Com., No. I.

¹⁶ Ibid.

¹⁸ Loc. cit.

²⁰ Loc. cit.

²² Ibid., No. I.

mother and sister, until then quite healthy, soon afterward showed symptoms of leprosy, and that all these cases died of it in less than two years. Again, in 1848, he delivered a woman, in the last stages of "elephantiasis," of a well-formed female child whose body was covered with leprous spots. On the upper portion of the concha of the left ear of this child were also well-developed leprous tubercles.

Hood¹ has seen the infant of a woman with tubercular leprosy developing that form of the disease when only a few months old.

Goldschmidt² declares, after twenty-five years' experience, that one-half of the cases may be traced to heredity; while Manson³ expressed the belief that it would be "difficult to conceive that the *lepra bacillus* could be handed down from father to son, or from grandfather to grandson; nor is it at all reasonable to suppose," he continues, "that leprosy becomes developed in collateral descendants of a common ancestor in consequence of the transmission of the bacillus itself through the semen or ova of intervening relatives, who themselves, very likely, were not leprous. Such a supposition seems absurd; but . . . we can understand that the appearance of heredity is brought about by the transmission of a physiological tendency to the production of a certain substance the possession of which is absolutely necessary for the development of the disease, and without which no one can become a leper. As with the tubercle bacillus, so with the *lepra bacillus*: certain individuals, with certain physiological characteristics, which are more or less hereditary, alone being susceptible."

Manson's hypothesis—and it need not, *per se*, exclude direct transmission of the bacillus from mother to child, more especially if, as claimed, these organisms have been found in the blood and lymph currents—recognizes as the cause of leprosy, the *bacillus lepræ*, "an organism very refractory to cultivation, growing only in a medium which, so far as known, exists only in the bodies of certain human beings. It is not present in everyone." Nor, in those in whom it is produced, is it present at all times; nor, when present, is it always so in equal amount. The bacillus escaping from the body of a leper, finds lodgment in a healthy person possessing this medium, and commences and continues to develop as long as supplied with this particular pabulum; but should this supply become exhausted, the bacilli pass into a condition in which they are powerless to resist the action of certain cells—which are not phagocytes, as they do not destroy the bacilli—into which they become incorporated—*i. e.*, they pass into or are taken within these cells, and remain *hibernating*, as it were, until supplied anew with this pabulum, when they enter again on a fresh phase of activity, they become extra-cellular, and are carried by the blood and lymph to other parts of the body, where

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

they set up "additional lepra centres. In this way the disease extends and old lesions are enlarged by local multiplication of the bacilli until the pabulum is again exhausted. The bacilli then enter, or are taken into, the cells again. This recurrence of events continues until the patient dies by gradual extension of lepra lesions, or by intercurrent disease." If, on the other hand, the bacillus enters the body of one who never produces this medium, or in one who does not produce it in sufficient quantities, or in one in which it is not produced in time, the parasite either dies or remains undeveloped and innocuous.

Manson thinks this hypothesis—and it seems as reasonable as any one of the many brought forward to explain certain phenomena of leprosy—explains the prolonged incubation period in so many cases; the difficulty in inoculating man and the lower animals; the quiescence and exacerbations so often seen in the disease; failure to cultivate the bacilli on artificial media; the lifetime immunity of persons in daily intimate association with lepers, and many other phenomena connected with leprosy.

Some writers, while not admitting the disease to be hereditary, look upon heredity as predisposing to it. Thin,¹ after tracing the malady through five generations, says: "It is only in recent years that a sufficient analysis of facts has shown the fallacies that have led to the acceptance of the idea that leprosy is hereditary." He points out, as a well-known fact, the disposition of the disease to hang to certain families.

Kaurin² never saw a congenital case of leprosy; does not believe it hereditary, but acknowledges that persons of "hereditary taint" are more liable to contract the disease, on equal exposure, than those not thus vitiated. Tache³ shares this opinion, as does Arning,⁴ Münch,⁵ Hellat,⁶ Lima,⁷ and many others; while Hansen⁸ thinks, if at all hereditary, it is very limitedly so. Arning⁹ says: "To my mind the theory of hereditary transmission of leprosy must ever appear as an heirloom of a past and gone era in the science of pathology."

To those requiring stronger evidence of hereditary transmission of leprosy than that recorded on the preceding pages, the histories of the following cases, from the writer's personal experience, will carry but little conviction with them:

The subject of Fig. 2, aged twenty-eight years, a shepherd by occupation, is the only child of a leper mother who died of puerperal fever at his birth. Her mother, a brother, and two sisters were lepers. When she married she moved to a distant place from where she was raised, to a locality where leprosy had never been known. He was

¹ Loc. cit.² Loc. cit.³ Loc. cit.⁴ Loc. cit.⁵ Loc. cit.⁶ Loc. cit.⁷ Journ. Lepr. Invest. Com., No. IV.⁸ Journ. Lepr. Invest. Com., No. I.⁹ Loc. cit.

born four years after his mother married; was raised on goat's milk; never saw a leper; had never left locality where he was born and raised until he did so to consult the writer; had lived, since ten years of age, out of doors, herding goats, high up in the Sierra Madre mountains; was never vaccinated; never had syphilis, nor gonorrhœa, nor skin eruptions. His food for most part has been goat's milk and flesh, eggs, beans, coffee, tortillas and dried fish occasionally. Nodules began on the ear and face at twenty, and gradually extended until they became plentiful on his hands, forearms, feet, and legs, with now and then an ulcer. Sections of skin from one of the tubercles, stained with the Ziehl-Neelsen carbol-fuchsin, showed lepra bacilli in great numbers.

The father, mother, two brothers, and three sisters of the subject of Fig. 3, had leprosy. She is the youngest child. Aged thirty-five; married; mother of five healthy-looking children and the wife of a ranchman in easy circumstances. At birth she was given to a childless aunt, who carried her at once a hundred miles away from place of birth and where leprosy was unknown. Never nursed her mother; was raised on asses' milk; never saw a leper and has had no direct communication with her own family nor with any other having leprosy. Has lived in the locality where she was raised and has never visited leper districts. Her food has been liberal, nutritious, and varied, and often contained fresh and dried fish.

Her attention was attracted, eight years ago, to an oval-shaped spot on the right arm, which was soon followed by another on the left. Since then the spots have slowly increased in size and multiplied in number, until she now has them on both shoulders, breasts, legs, and feet. The circular spot to be seen on her left forearm began some six months ago as a small, dusky, rose-colored discoloration of the skin. As it increased in circumference its central hue grew lighter and lighter until it became almost white. Within this spot—and all the others present the same characteristics—more marked in and nearest the centre, the sensibility is diminished to almost complete anæsthesia. Both ulnar nerves are enlarged and sensitive; the fingers and toes are clumsy, somewhat anæsthetic and formicating.

On the left side of the face three tubercles may be seen; there is also one on the lobule of the right ear. The first to appear, about two years ago—that on the cheek—being much the largest of the three. A section of skin from this tubercle contained enormous quantities of bacilli—twenty times as many, or more, than in skin taken from the spot on the left arm. (Philippon¹ reports having found “swarms” of bacilli in skin taken from acute erythematous patches of lepra; but the writer has never seen them in such quantities, except in skin from tubercles.)

The life-period of the bacillus lepræ is unknown—no culture experiments having, as yet, been successful; but if it be like that of its congeners of lupus and tuberculosis, capable, under favorable conditions, of prolonged hibernation and of resuming vital activity when influenced by propitious circumstances—the presence of Manson's “cultivating medium,” whatever that is—the fact that the disease it engenders, like lupus and tuberculosis, while it may appear at any period of life, is seen

¹ Monats. f. prakt. Derm., No. 9, 91.

FIG. 2.



FIG. 3.



FIG. 4.

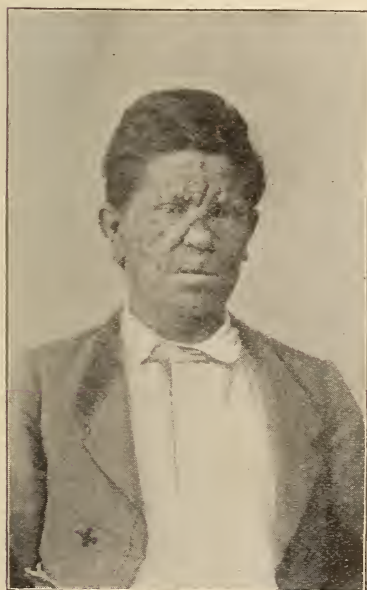
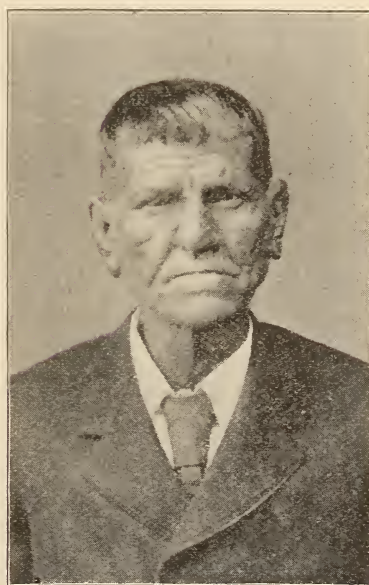


FIG. 5.



with greatest frequency between the ages of ten and thirty years, is, in the writer's humble judgment, a stronger argument in favor of than against heredity.

The statement of non-believers in the hereditary transmission of leprosy, that the disease renders the male impotent, is true only after it has made considerable progress, and is not always true even then; it does not apply to the female at all. The original of Fig. 6 has been under the writer's observation for the last ten years; he was a confirmed leper when first seen, and his youngest child is but three years of age. The original of Fig. 2, taken four years ago, himself the son of a leper mother, had a child born to him since his photograph was made, while the mother of the subjects of Figs. 4, 7, and 8, and the mother of the subject of Fig. 3, bore numerous children after becoming lepers, if, indeed, either of them were ever otherwise than lepers, for, from information furnished by reliable parties, the families of both, for several generations back, have contained male and female lepers—families to which leprosy has clung for ages.

If, as seems proved beyond controversy, the bacillus of leprosy, let it enter the human economy howsoever it may, is taken up by the leucocytes and other cells and circulates in the blood and lymph currents to internal organs, such as the liver, spleen, medulla of bone, etc., the writer knows of no reason why it may not, with equal facility, be carried to the fœtus *in utero*, and in this way directly transmit the germ, if not the disease, by inheritance. When it is remembered that Birch-Hirschfeld and Schmal¹ have recently found tubercle bacilli in the umbilical cord and in the blood of the umbilical vein, and that Solles² has produced tuberculosis in guinea pigs by inoculating them with spermatic fluid taken from the seminal vesicle of a tuberculous subject, the difficulty of conceiving how lepra bacilli may be handed down from parent to child fades into absolute nothingness.

In September, 1884, Arning³ inoculated, in the Hawaiian Islands, a man by the name of Keanu—who was thought to be free from all leprosy taint—with leprosy material taken directly from a child who had severe tuberous leprosy, and who had just gone through leprotic fever. The inoculation was made by introducing a small piece of the leprosy nodule under the skin of the left forearm. In four weeks Keanu had rheumatic pains in the left shoulder, followed by pain in the joints of the arm and swelling and pain in the ulnar and median nerves, without fever. Within six months the neuritis decreased, and a small leprosy nodule formed where the inoculation had been made. Sixteen months later lepra bacilli were still to be detected at the point of inoculation. In

¹ Beiträge zur. path. Anat. u. zur. allg. Path., 1891.

² Journ. de Méd. de Bordeaux, 1892, No. 5.

³ Loc. cit.

FIG. 6.



FIG. 7.

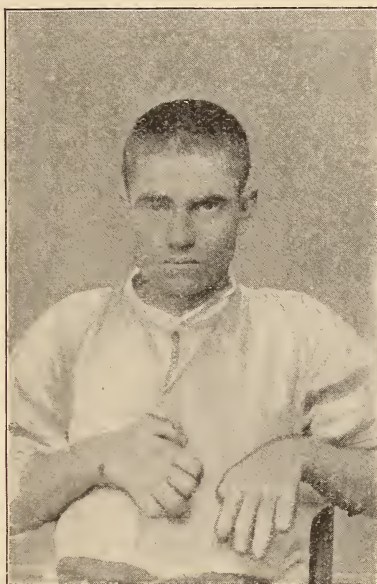
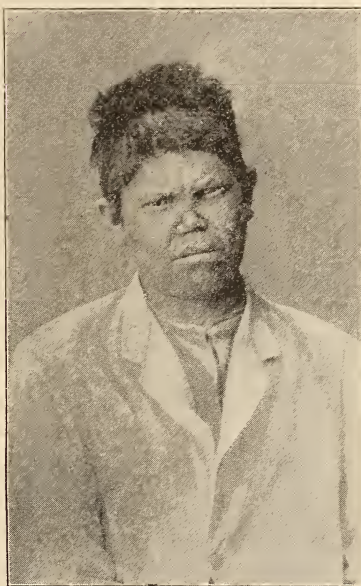


FIG. 8.



FIG. 9.



September, 1887, Keanu showed distinct symptoms of leprosy, and in another year the disease was at its acme.

This case was for a time thought demonstrative of the inoculability of leprosy, but it soon came to light that a son, a nephew, and a cousin of Keanu had leprosy, when it began to lose prestige as such, until to-day it is regarded as proving nothing whatever in that direction. Notwithstanding this, however, and notwithstanding that efforts to inoculate healthy persons with leprosy material have failed in Norway and Italy, many, experienced in the management and care of the disease, regard it as inoculable, while others of equal opportunities deny that it is. Mitra¹ says: "Contagion by inoculation is possible and often occurs; . . . and that all the different ways by which syphilis can be passed from one individual to another, extra-genitally, hold good for leprosy."

Arning,² Murray,³ Cayley,⁴ Francis,⁵ Hederstam,⁶ Manson,⁷ Swift and Montgomery,⁸ Olavide,⁹ White,¹⁰ Wilson,¹¹ Martin,¹² Bakewell,¹³ Fox,¹⁴ Castor,¹⁵ Ebden,¹⁶ Bemiss,¹⁷ Hildebrandt,¹⁸ Mouritz,¹⁹ Gairdner,²⁰ Black,²¹ Brunt,²² Daubler,²³ Piffard,²⁴ Hillis,²⁵ Leloir,²⁶ and others, are of the opinion that the disease is inoculable, some of them reporting cases in justification of their faith.

Abraham,²⁷ analyzing these and other reported cases of supposed inoculation by vaccination and otherwise, admitted that instances have, occasionally, been reasonably demonstrated of its communication from one infected person to another previously healthy, contends that "Even the most suspicious cases . . . are open to the objection that there is nothing to show that the subjects had never been exposed to any other possible means of inoculation or contagion, had never been in contact with lepers, or had never had to do with food or anything else which might have been contaminated by lepers; in short, one could not be sure that having been born, or having lived for some time in a leper land, they had not been exposed to other pathogenic conditions of the disease; . . . and that while up to the present time no absolutely clear and incontrovertible evidence connecting vaccination with leprosy had been forthcoming," he admits, "*a priori*, the possibility of an occasional accidental inoculation of the disease in this way," and thinks medical men should exercise extreme care in selecting vaccine lymph, and should avoid indiscriminate arm-to-arm vaccination where leprosy is endemic.

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

⁴ Loc. cit.

⁵ Loc. cit.

⁶ Journ. Lepr. Invest. Com., No. I.

⁷ Loc. cit.

⁸ Occid. Med. Times, September, 1890.

⁹ Loc. cit.

¹⁰ Loc. cit.

¹¹ London Lancet, August 22, 1891. Abstract of Dr. Abraham's paper before Internat. Cong. of Hygiene, 1891.

¹² Ibid.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

Donovan¹ can find no evidence in support of the idea that leprosy is communicated by vaccination; neither can Ashmead,² nor Rake and Buckmaster.³

These latter gentlemen, members of the "Leprosy Investigation Committee," vaccinated eighty-seven patients at the Almora Asylum, Robbens Island, in 1891, from which they made ninety-three microscopical preparations, in no one of which did they *undoubtedly* find lepra bacilli. "Suspicious-looking rods taking fuchsin were seen in one case in vesicles raised over tuberculated ears, and in another case in vesicles over anæsthetic patches."

Looking at the subject from every side, Rake and Buckmaster conclude "that the risk of transmission of leprosy by vaccination is so small, that for all practical purposes it may be disregarded."

Very many physicians in Mexico, those who have seen much of leprosy—laymen also—recognize the *a priori* danger of transmitting it by vaccination; but the writer has never met a leper who claims to have been inoculated in that way; and in every case claiming to have been inoculated at all, he has ascertained the possibility of the disease being contracted in divers other ways. The majority of them date the beginning of their malady from getting wet in cold weather—possibly from the rheumatic pains so constant in the early stage of leprosy.

The efforts to cultivate lepra bacilli, made by Rake and Buckmaster,⁴ Kanthack and Barclay,⁵ Abraham and Crookshank,⁶ Koch,⁷ Christman,⁸ Stallard,⁹ and others, have all failed, and if the experiments being made by Campana¹⁰ be not successful, then, in the language of Hansen¹¹ and of Stuart,¹² it may be said that, up to this time—April 20, 1892—"no body has succeeded in cultivating the bacillus of lepra."

Equally futile have been the attempts of Kaurin,¹³ Goldschmidt,¹⁴ Favarat,¹⁵ Christman,¹⁶ Rake,¹⁷ Kanthack,¹⁸ Barclay,¹⁹ Campana,²⁰ the writer, and many others to inoculate the lower animals with lepra bacilli; and the claim made by Bordoni-Uffreduzzi, in Turin, of having cultivated the bacilli from the marrow of bone, and that of Ortmann, of successfully inoculating it on rabbits, has not been substantiated by others, and is generally regarded as a mistake.

The contagiousness of leprosy is asserted and denied with much vehemence by a great many whose position and experience should constitute them competent judges in the premises. Very much the same

¹ Loc. cit.

² Loc. cit.

³ Journ. Lepr. Invest. Com., No. IV.

⁴ Brit. Med. Journ., June 27, 1891.

⁵ Brit. Med. Journ., August 27, 1891.

⁶ Journ. Lepr. Invest. Com. No. IV.

⁷ Ibid.

⁸ Centralbl. f. Bakt. u. Parasit., x. 1890, iv.

⁹ Occid. Med. Times, April, 1890.

¹⁰ Journ. Lepr. Invest. Com., No. IV.

¹¹ Loc. cit.

¹² Vierordt's Med. Diagnosis.

¹³ Loc. cit.

¹⁴ Journ. Lepr. Invest. Com., No. IV.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Loc. cit.

¹⁸ Brit. Med. Journ., June 6, 1891.

¹⁹ Ibid.

²⁰ Journ. Lepr. Invest. Com., No. IV.

argument is used against the contagiousness of leprosy as that relied on to disprove its inoculability and transmissibility by heredity, viz.: that all the reported cases of supposed contagion lived, or had lived, in localities where lepra was endemic; hence they might, with equal propriety, be considered examples of infection. The well-known case of Father Damien may be given as one in point. It was once very generally accepted as tending to establish the theory of contagion. But it is now urged by Rake¹ and others, that as "he lived in a leper colony for a number of years, and then developed leprosy, he may have absorbed the specific virus in many other ways, *e. g.*, in food, water, air, etc." Rake then refers to a case reported by Dr. Hawtry, of a man who "returned to Ireland, after many years of service in India, and developed leprosy, of which he died. His brother, a laborer, who had never been out of the United Kingdom, slept in the same bed with him, and in course of time he, in his turn, became a leper. Except his brother's, no case of leprosy had occurred in the neighborhood, according to tradition, for centuries."

In all reported cases of contagion Hutchinson² thinks the food hypothesis equally probable with that of contagion; and Mitra³ "can only cite one case, that of a wife from her husband, where a leper has transmitted the disease to any member of his family, however intimately they may have commingled," and as already stated, believes it "contagious by inoculation." Taché⁴ holds "contagion as the cause of the propagation of the disease." Blanc⁵ thinks the disease "may be communicated by a leprous person by means of a specific virus, which acts somewhat like the specific poison of syphilis, depending upon a thin or denuded surface for its absorption, and which remains potent, very probably, for an indefinite period of time." Arning⁶ contends that it is contagious. Münch⁷ ranges himself "on the side of the deeply convinced believers in its contagiousness." Lima⁸ cites cases of supposed contagion "sufficiently eloquent to render unnecessary further illustration." Thin⁹ traced sixty cases of leprosy in Parcent, where the disease did not exist before, to infection from a leper who went there in 1850. Donovan¹⁰ says: "There is no longer any room to doubt that leprosy may be classed among parasitic diseases, and is consequently infective, its products being specifically contagious." According to Hellat,¹¹ the "rapid increase through free communication and the just as rapid decrease of the disease by isolation, are explained without difficulty by means of infection." Goldschmidt¹² concludes, after twenty-five years' experience, and after having to do with most of the known cases in Madeira, "that

¹ Loc. cit.² Loc. cit.³ Loc. cit.⁴ Loc. cit.⁵ Loc. cit.⁶ Loc. cit.⁷ Loc. cit.⁸ Loc. cit.⁹ London Lancet, January 16, 1892.¹⁰ Loc. cit.¹¹ Loc. cit.¹² Loc. cit.

infection is directly propagated from man to man, or what was in immediate contact with the diseased body." Koch¹ asserts that "the fact appears clear enough that under certain conditions, about which we at present know little, the disease may be transmitted by contagion." Cornil and Babès² define leprosy as a chronic infectious malady.³ Hicks⁴ declares there is the strongest evidence that the disease is contagious. Simmons⁵ reports several cases of contagion; while Wheeler⁶ thinks that "it requires hereditary tendency for infection." Ross⁷ looks upon the question of contagion as an open one, but writes: "It is demonstrable that leprosy is communicable, to some extent, in the same sense as cancer or syphilis." Boinet⁸ analyzed eighty cases and found the possibility of direct contagion in fifty-one. Hillis⁹ writes: "A further experience of ten years has convinced me more firmly than ever that leprosy is a communicable disease;" and Castor¹⁰ thinks "there is sufficient evidence found even in lay journals that it is communicable." Bouchard¹¹ deplores the false and dangerous security hidden in the "optimistic chimera" that leprosy is not contagious. Moore¹² asserts: "After the number of cases which have been reported, there seems no reasonable doubt that leprosy may be communicated from one individual to another." Cayley¹³ and Murray¹⁴ share this opinion; and Phillippo¹⁵ distinctly states his opinion "that it is contagious." Heidenstam,¹⁶ after eleven years' service in the leper asylum in Cypress, "is more than ever convinced of the communicability of lepra." Lutz¹⁷ thinks "infection from one person to another responsible for the larger number of lepers in Honolulu." "Archdeacon Wright¹⁸ has published a book in which he has brought together evidence collected from various sources, . . . showing that leprosy is contagious; and Mr. Macnamara has published a second edition of a pamphlet originally published in Calcutta in 1866, in which he expressed the opinion that leprosy was communicable. Zuñaga has published facts observed by him at the village of Limat Vallidigna, Spain, which appear to point very unmistakably to the transmission of leprosy by contagion." Stallard¹⁹ and White²⁰ regard the spread of leprosy in the Sandwich Islands as affording absolute proof of contagion. Olavide,²¹ in an experience of twenty-five years, and after investigating five hundred cases, has never seen any evidence

¹ Loc. cit.² Loc. cit.³ La lèpre est une maladie infectieuse chronique.⁴ Brit. Med. Journ., November 8, 1890.⁵ Journ. Lepr. Invest. Com., No. III.⁶ Journ. Lepr. Invest. Com., No. II.⁷ Journ. Lepr. Invest. Com., No. II.⁸ Journ. Lepr. Invest. Com., No. III.⁹ Journ. Lepr. Invest. Com., No. II.¹⁰ Journ. Lepr. Invest. Com., No. III.¹¹ Enfermedades Infecciosas.¹² Loc. cit.¹³ Loc. cit.¹⁴ Loc. cit.¹⁵ Loc. cit.¹⁶ Journ. Lepr. Invest. Com., No. I.¹⁷ Journ. Lepr. Invest. Com., No. I.¹⁸ Brit. Med. Journ., Dec. 28, 1889.¹⁹ Brit. Med. Journ., Dec. 21, 1889.²⁰ Int. Ency. Surg., vol. ii.²¹ Rev. Clin. de los Hosp., Madrid, 1889.

of transmission of leprosy by contagion, and has never seen but one case who claimed to have contracted the disease in that way; he thinks, *a priori*, the disease should be contagious. Macnamara¹ reports a case of contagion, and says the disease "is contagious, not in the same way as we understand this expression when applied to such diseases as the exanthemata, but slowly, in such manner as it is now held that phthisis pulmonalis is contagious . . . it is a disease which is slowly contagious under certain conditions of environment and individual idiosyncrasy."

Of leprosy in Crete, Biliotti² writes: "That it is not contagious, or is very slightly so, is proved by the fact that there are several cases of healthy women married to and living with lepers for years without being in the least affected." Dixon³ says: "The evidence gathered from officials and patients, long resident on Robbins Island, shows that there is no authentic instance, with possibly one exception, of any non-leprous person on the island having contracted the disease from contact, either directly or indirectly, with leper residents." Flinders⁴ writes from New Zealand "that the immunity from the disease, enjoyed by women who have lived for years with leprous men and *vice versa*, makes it difficult to believe that it is infectious or contagious in the ordinary sense." Bulkley⁵ thinks "the disease is not contagious in the ordinary acceptance of the term, as applied to such diseases as smallpox, scarlatina, or syphilis," but admits "there is evidence that when acquired the disease may, under favorable conditions, be transferred from one person to another;" and, finally, Hansen⁶ says: "It is said that it is not contagious in the ordinary sense of the word; probably I do not know what the ordinary sense of the word is; but if someone would say communicable instead of contagious, I would not object. . . . I, for my part, prefer what is plainest and most intelligible, and that is the contagion hypothesis."

The subjects of Figs. 5 and 6 illustrate most aptly the fact that lepers may live for years with the healthy without imparting the disease in any, as yet, recognizable shape. That of Fig. 5—the only member of his family who ever had leprosy—resided for sixty-two years in a locality where the disease has been endemic for the past two hundred years; where 30 per cent. of his neighbors are lepers; on terms of the most unrestricted social intimacy with lepers in every stage of the disease; using the same utensils, sleeping often in the same bed, in rooms without ventilation; drinking from the same goblets; wearing the same clothing; dressing the ulcers of, and caring for, his "unclean" friends without limit or restriction whatsoever, without contracting the disease. He is now seventy years of age, and the victim of *lepra tuberosa*, having passed through the other two stages of the disease. His disease commenced (*i. e.*, the writer has been his physician for ten years, and up to eight years

¹ London Lancet, March 26, 1892.

³ Loc. cit.

⁵ New York Medical Record, No. 1113.

² Journ. Lepr. Invest. Com., No. III.

⁴ New York Medical Record, No. 1113.

⁶ Loc. cit.

ago he, the subject, declares he has never had a day of sickness since childhood, and he certainly looked the picture of health) with a burning, erythematous-looking eruption on both legs, midway between the knee and ankle, which gradually extended up and down and around the leg until it reached nearly to the knee and ankle, and had nearly surrounded the leg. *Pari passu* with the peripheral extension of the macula, its centre faded into a dusky white. In the meantime the legs began to swell, and the patient to complain of numbness and stiffness of the limbs with fugitive, rheumatic pains up and down, to the knees above and toes below. Pressure over the course of the musculo-cutaneous, anterior tibial, and internal saphenous nerves caused severe pain. As the maculæ gradually faded away—the skin never returned to its natural hue, but remained lighter in color—the pains subsided and the numbness increased to semi-anæsthesia; partial muscular atrophy following with loss of both little toes. A few maculæ, similar to the ones described, appeared on other portions of the body.

Four years from the (apparent) beginning of the disease in this case, tubercles formed on the lobules of the ears, nose, forehead, cheeks, lips, chin, hands, and feet, until they occupied these parts in as thick profusion as is seen in Figs. 2 and 4, and also in Fig. 1 of Duhring's article in THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1892.

The original of Fig. 6—as may be seen, a most repulsive-looking object—has lived with his family in the same poorly-ventilated house; occupying the same bed; eating and drinking from the same vessels; in short, he has lived with them—four sisters, their husbands, their children, his wife and their children—in a locality where the disease has also been endemic for *two hundred years, surrounded by the most insanative of environments, without imparting the disease to any of them in any, as yet, recognizable form—they all appear healthy.* And so, also, with the father of subjects of Figs. 4, 7, and 8. He lived twenty years with a leper wife, and ten years with leper sons, under as unfavorable hygienic conditions as the cases recorded above, and is, to-day, April 20, 1892, apparently as healthy and vigorous as any man of his age (sixty) and physique.

Concerning the *treatment* of leprosy, there is as much difference in opinion as there is about the manner of its propagation.

Mitra¹ found gurjun, chaulmoogra, and creolin useful to heal ulcers, but powerless to arrest the disease. Nerve-stretching, in his hands, was of palliative value in fifty cases of anæsthetic leprosy. Donovan² reports marked benefit from gurjun oil, internally and externally, in some cases. Taché³ thinks attention to functional disorders, palliative treatment, attentive nursing, while working no cures, are highly beneficial. Lima⁴ regards with favor applications of "gynocardic acid, the oil of *Gynocardia odorata*, and phenic acid; and in case of leprous fever, salicylate of soda. Externally, frictions of pyrogallie acid, ichthyol, and chrysarobin. For large leprous tumors, friction with vaseline con-

¹ Loc. cit.

² British Medical Journal, August 8, 1891.

³ Loc. cit.

⁴ Loc. cit.

taining sublimate, and the thermo-cautery of Paquelin, as excellent measures for their reduction." He claims that by these means patients sometimes gain "both in vigor and weight." Goldschmidt¹ has never obtained any "lasting benefit from any of the varied measures" he employed. Koch² summarizes the treatment of leprosy in the following language: "No drug has yet been used which exerts a specific action on leprosy; of the drugs used, chaulmoogra oil seems to act most beneficially."

Münch³ asserts "that the efficacious action of certain drugs (creosote, oleum chaulmoogra, etc.), and the apparent convalescence of lepers during the period of florescence, could, with greater reason, be attributed to the more rapid passage, during the employment of one remedy or another, of the florescent stage into the regressive." He cites a case "whose infiltrations, after the use of creosote, disappeared entirely;" but, "on post-mortem examination, an enormous number of lepra bacilli in the skin, nerves, nervous knots, lymphatic glands, spleen, liver, etc., proved the patient still leprosy."

Rake,⁴ writing of the results of two cases of amputation for leprotic gangrene, says: "Very much may be done by operative interference in leprosy, even in desperate cases;" and with regard to the use of chaulmoogra oil, he observed "increase of perspiration, decrease of tubercles, improved appetite and sense of well-being, increase of sensation, increased suppleness of the skin, and lessening of pain in the joints."⁵

Roose⁶ says some benefit may be derived from the remedies usually employed; while Pontoppidan⁷ lauds salicylate of soda, especially in anæsthetic leprosy. He has seen it cut short the fever and stage of acute eruption, and cause absorption of newly formed tubercles in tubercular leprosy; but never saw any "permanent" benefit follow ichthyol, Unna's treatment, chaulmoogra oil, nor salicylate of mercury. In his experience, iodide of potassium always caused increase of eruption, and for this reason he thinks it of value in determining if a given case is cured; if no eruption follows its use, the case may be considered radically cured(?).

Bakewell,⁸ commenting on the treatment of Beaupterthuy, considers it could only be successful when commenced early in the disease. This method—the one he follows—consists of three parts:

1. Hygiene or dietetic, including removal to a healthy locality, good diet, cleanliness, separation from other lepers, and protection from infection from mosquitoes. 2. The use of external applications, especially

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

⁴ British Medical Journal, March, 1890.

⁵ Journal of Leprosy Invest. Com., No. II.

⁶ Leprosy and its Prevention.

⁷ Monats. f. prakt. Derm., 1890, vol. x.

⁸ Abstract of a paper read at a meeting of the Royal Medical and Chirurgical Society, May 27, 1890. British Medical Journal, May 31, 1891; also, Journal of Leprosy Invest. Com., No. I., and discussion thereon.

the oil of cashew-nut (*Anacardium occidentale*), generally, of nitrate of silver to anæsthetic parts, and of liniments to other parts. 3. Internal medication by small doses of alkaline salts. Beuperthuy used mercuric chloride; Bakewell had not found it of value. Most reliance was placed upon the external treatment. The oil of cashew-nut produced sufficient irritation to cause slight oozing, which went on for a day or two and then dried and left a scab. When this fell off the tubercle was diminished in size. The process was repeated two or three times. In more chronic cases with much anæsthesia, a mixed solution of nitrate of silver and copper gave the best results. Care must be taken not to apply the oil over too large a surface—for example, never more than six inches square. Bakewell urged that treatment, both medical and hygienic, should be vigorously carried out in the early stage. Mr. Macnamara could not agree with the author's views as to the curability of leprosy. He had never seen a case which was even relieved by treatment, though it was true that there was a quiet stage during which apparent improvement took place. When once established, the disease advanced from bad to worse. Dr. Thin insisted that occasionally the skin lost its anæsthesia and became sensitive and the spots disappeared; this was generally due to the use of some external irritant. He thought the disease might be arrested, and mentioned that Mr. Hutchinson had shown a case to the Society. The woman was now well, whereas twenty years previously she was afflicted with marked tubercular leprosy. Dr. Abraham thought that a cure ought to be attempted, though it was not always easy to recognize the earliest symptoms. The disease was probably not curable, though it might abort and die out. The drug preferred by lepers themselves was chaulmoogra oil.

Bergé¹ extols this remedy (chaulmoogra oil), and gives notes of three cases in which it was employed with great benefit. The results seem remarkable. The dosage was ten drops of the oil in a spoonful of water three times daily, gradually increased until forty-five drops three times daily were taken without disturbance of the alimentary canal, except in large doses, when the bowels were acted upon too violently. The author thinks the oil should be regarded as a specific. Its absorptive properties were manifested in a striking degree upon the tubercular infiltrations; it afforded relief to the nervous phenomena, relieved the anæsthesia, and restored health to the body and mind.

Bourns² says reliance can only be placed in chaulmoogra and gurjun oils. Moore³ writes: "Under the influence of tonics, oils, nourishing diet, good personal hygiene, and general sanitation, improvement often takes place, and the progress of the disease may, perhaps, be temporarily

¹ See AMER. JOURN. MED. SCI., April, 1892, p. 473.

² Int. Med. Ann., 1889.

³ Loc. cit.

arrested. The cachetic leper becomes a robust leper; but the leper remains a leper." He knows of "no remedial agent which directly affects leprosy."

Murray¹ has exhibited most of the medicines in the Pharmacopœia, with temporary relief in many cases; but the disease soon resumed its active state. He found the inspissated milky juice of the *Calotropia gigantea* the most efficacious of any drug employed.

Van der Straaten² has known treatment by chaulmoogra oil, as an inunction and taken internally, to have been very beneficial in several cases.

Lutz³ reports, after six months' work at the Kalihi Hospital, that several of the tubercular cases showed a marked improvement, no fresh symptoms appearing and the old ones diminishing gradually . . . and a similar effect on the large brownish pigmentations peculiar to the tuberous form in active state. He used chaulmoogra oil, gynocardic acid, salol, salicylate of soda, creosote, nitrate of silver, antipyrine, mercury, iodine, etc. He is of opinion that the principal treatment should be general, and directed against the first outbreak, the feverish and eruptive period, and to removing the deposits. He favors chrysarobin for this latter object, in a 5 or 10 per cent. solution.

Stallard⁴ had proved to his own satisfaction that leprosy can be arrested and prevented by abundant good nourishing food and proper hygiene; while White⁵ asserts there is no specific remedy for leprosy, but that it may be delayed by removal, at an early stage of the disease, to regions where it is not endemic.

Rake⁶ resorted to nerve-stretching in one hundred cases; but the operation seemed of value only for the pain associated with ulceration, in which relief was often very marked.

"Leprosy is regarded by many as incurable, nevertheless reports of recoveries seem to be gradually increasing in number, although no new remedies have been discovered."⁷

Francis⁸ reports a case of an Englishman, born in India but educated at home, who contracted the disease in India, returned to England, and was so far cured in three years that he looked "stout, ruddy, and in perfect health and spirits," and remained so up to the last information he had of him.

Kaurin,⁹ while denying there is anything like a specific for any stage of leprosy, says that, "if taken at an early stage, the disease may be cured by good diet and regimen, by careful nursing of the skin, baths, and symptomatic treatment."

¹ Loc. cit.

² Loc. cit.

³ Bien. Rept. of Pres. Bd. of Health, Honolulu, 1891.

⁴ Brit. Med. Journ., December 21, 1889.

⁵ Int. Ency. of Surg., vol. ii.

⁶ Brit. Med. Journ., December 28, 1890.

⁷ Editorial, Med. News, No. 947.

⁸ Journ. Lepr. Invest. Com., No. IV.

⁹ Loc. cit.

Blanc¹ reports recovery of a case of "maculo-anæsthetic" leprosy after prolonged use of chaulmoogra oil internally and pyrogallol locally.

Lima² looks upon the disease as incurable, but admits the occurrence of a few cases of "spontaneous recoveries."

Fox³ publishes a case presenting all the typical lesions of leprosy, under his observation for many years, who recovered after the systematic use of chaulmoogra oil.

Hellat⁴ regards leprosy as "incurable," and Wheeler,⁵ Roose,⁶ Abraham,⁷ and White,⁸ indorse this opinion.

In the discussion of Bakewell's paper before the Royal Medical and Chirurgical Society, already quoted from, Thin said he had seen "a case in which the anæsthesia of the skin had been got rid of by treatment;" and that a medical man practising in Jerusalem reported a case, under observation for several years, in which a cure appeared to have been effected.

Commenting on these cases, and those reported by Unna, Fox, and Hutchinson, and on the official report from the Norwegian Asylums, where thirty-five cases were reported cured within the last five years, Abraham said: "One did come across cases in the records of asylums, in which the disease seemed, in course of time, to have died out or to have stopped its progress; from which it could be inferred that every case was not hopeless."

Phillippo⁹ cured a case after nearly six years' constant use of gurjun and chaulmoogra oils. He thinks that "many of the reported failures with these oils are due to their improper and insufficient use, both as regards time and quantity. As a rule, it can only be properly done in specially appointed hospitals or asylums, where the necessary conditions obtain for such prolonged and troublesome treatment."

Tuberculin, in leprosy, seems to exert no marked influence in any way. Danielssen¹⁰ treated with it five cases of anæsthetic, three of tubercular, and six cases of mixed leprosy for four months without benefit. Abraham¹¹ treated a case of tuberculous leprosy with tuberculin, with some improvement, and a case of macular leprosy, with marked benefit. Arning¹² could see no good results in two cases of tubercular variety on whom he used it; nor could Babès and Kalindero,¹³ in seven; nor Donovan,¹⁴ in three; nor Goldschmidt,¹⁵ in five. Donovan noted increase in weight, and his patients professed feeling better in every way; but he could not appreciate any change in the appearance and character of the

¹ Loc. cit.

² Loc. cit.

³ New York Med. Journ., February, 1896.

⁴ Loc. cit.

⁵ Loc. cit.

⁶ Loc. cit.

⁷ Loc. cit.

⁸ Loc. cit.

⁹ New England Med. Monthly, No. 10.

¹⁰ Monats. f. prakt. Derm., August, 1891.

¹¹ Loc. cit.

¹² Loc. cit.

¹³ Journal of Leprosy Invest. Com., No. II.

¹⁴ Loc. cit.

¹⁵ Berlin. klin. Wochenschr., January, 1891.

tubercles, atrophic changes, or anæsthesia. Ferrari,¹ analyzing the trials made with tuberculin by Goldschmidt, Martins, Joseph, Neumann, Arning, Hallopeau, Bardeleben, Babès and Kalindero, Maes, Kaposi, Watson Cheyne, Danielssen, and De Amiéés, and detailing his own observations in eight cases in the tuberculous stage, concludes that it produces no direct beneficial action on the leper.

The writer has experimented for the past ten years with a great many drugs, on a great many lepers; and while he has seen some truly marvellous results—results he was in nowise prepared to witness—follow the use of certain measures, he is not prepared to assert positively that he has brought about a *radical cure* of a single case of leprosy, in either of its stages. Arsenical, mercurial, and iodine preparations, in his hands, when the disease was not associated with syphilis—and it is often thus associated—have been worse than useless; but he has seen such very marked improvement, in all three stages of leprosy, follow the systematic use of chaulmoogra oil, internally and locally, associated with an improved dietary and personal hygiene, in a sufficient number of cases to induce the belief that, while in no sense a specific, as regarded by Bergé, *if commenced early in the disease, and continued long enough and uninterruptingly, and associated with proper food and hygiene, it will cure the disease in many instances.* Of course, there are many cases it will not benefit, probably a large majority of them, but the writer has never seen it properly used without notable improvement, especially in the tubercular stage. *He has seen tubercles absorbed, anæsthesia removed, eruptions disappear, ulcers heal, pains quieted, suppleness and elasticity of the skin restored, and hope take the place of despair under its use.* The writer begins treatment with ten drops of the oil, in gelatin capsules, after each meal, to be taken with a glass of milk, the quantity to be gradually increased until from one to two drachms of the oil is taken daily; but few can take as much as two drachms daily without producing diarrhœa. At the same time the patient is bathed every second day with warm water and soap, the oil is warmed and well rubbed into the skin, over the entire body, including ulcers, maculæ, and all.

The subject of Fig. 6 has been the object of experiment for ten years. During that time he has been subjected to almost every variety of treatment (except tuberculin) without benefit, unless cod-liver oil with hypophosphites, which he took for one year, retarded the progress of the disease—and it seemed to do so, as it made no appreciable advance during that period. Ten years ago he was a confirmed leper in the tubercular stage, and when he commenced, one year ago, the use of chaulmoogra oil, was as hideous a specimen of suffering humanity as is often met with. He was covered from head to foot, with ulcers and tubercles. His mouth, lips, nose, cheeks, throat, and larynx were all extensively ulcerated; and he was entirely aphonic, and swallowed with

¹ "La Tuberculina Koch, nella Lebbra," Accad. Gioenia di Catania, May 24, 1891.

the greatest difficulty. He has taken a drachm and a half of the oil daily for eight months, and has had it rubbed into the skin, with equal frequency, for a year. His improvement has been gradual and continuous, and on the 1st of March, 1892, he presented the appearance, repulsive as it still is, shown in Fig. 6. *All the ulcers are healed* but the one on the right jaw, the tubercles have almost entirely disappeared; he can now swallow without difficulty; his voice, although high-pitched and screeching, has, in a great measure, been restored. He has gained twenty pounds in weight; has returned to his former vocation, herding goats, and the poor creature, disfigured out of all recognition of his former self, is now hopeful of eventually ridding himself entirely of his dreadful enemy.

The writer regrets exceedingly not being able to exhibit a photograph of this case at the time he began using the oil; but, as with the subject of Fig. 5, nothing could induce him to be photographed—the appeal of family, friends, clergy, nor the offer of money.

Fig. 9 shows the condition of the subject of Fig. 8 on April 1, 1892, four months after the latter was made, and three months after treatment was commenced. He, too, had ulcers in the nose, larynx, and on the feet and legs, and was aphonic, but not to the extent of the subject of Fig. 6. Ulcers are nearly all healed; his voice, while stridulous, is greatly improved, and, as may be seen, the tubercles are notably diminished in number and in size, leaving, in many places, in their stead, a coppery discoloration of the skin. A section of skin, from one of the spots, the former site of a tubercle from which a section was taken before treatment began, examined a few days ago, still contains numerous *lepra bacilli*, but not one-third as many as were found in the tubercle.

One of the chief obstacles in the treatment of leprosy is inducing lepers to persevere in the methods employed. They soon lose all hope, regard themselves as social outcasts—although their liberties are not abridged in Mexico—become lethargic, indolent, careless, and often repel, in anger, the efforts of family and friends in their behalf; they seem to become de-humanized in the extreme.

In 1886 the writer had under observation a tubercular leper who contracted violent erysipelas of the head and face; upon recovery and after complete desquamation, it was noticed that *every small tubercle had disappeared and that the larger ones had greatly diminished in size wherever the erysipelas had been*. Remembering this case, and that Danielssen and Boeck,¹ Rake,² and Hardy³ had observed complete disappearance of leprous tubercles after vaccination and after variola, he (the writer) concluded, notwithstanding Campana⁴ is reported to have inoculated lepers with erysipelas without affecting the leprous progress, to inoculate the subject of Fig. 5 with erysipelatos material. This he did in November, 1891, and with the most gratifying results, so far as the leprous process was concerned. As already stated, the head, ears, face, nose, lips, etc., of this patient were once as thickly covered with leprous

¹ Brit. Med. Journ., June 3, 1891.

² Ibid.

³ Ibid.

⁴ Ibid.

tubercles as were the corresponding parts of the subjects of Figs. 2 and 4, but when he recovered from the induced erysipelas, his face, etc., were almost smooth. He was at once placed on chaulmoogra oil, and is steadily improving. He has gained in weight and strength; the numbness of legs and feet are giving way to returning sensation; he walks with greater ease, and the remains of the tubercles on his face, hands, feet, and legs *have entirely disappeared*.

This experiment, crude in the extreme, was made with a bistoury smeared with blood from an erysipelatous subject, into a tubercle on the patient's forehead; and it came near costing him his life, for the disease that followed was of a most virulent type. This taught a wholesome lesson, and one not soon to be forgotten: *such crude inoculations are too dangerous for application even on lepers*.

Although questioned by some, it is generally regarded as true that leprosy was once almost entirely eradicated from among civilized people, by collecting lepers and confining them in hospitals and asylums erected for such purposes. So universal was this practice—the product of Christian influence—throughout the East during the thirteenth and fourteenth centuries, that it is said: “These buildings almost literally covered the face of the Continent, being numbered by thousands in every country. Every considerable town had one or more of them in its neighborhood, and scarcely a town or burgh in France was unprovided with such an establishment;”¹ and there are very many having to deal with leprosy to-day who believe a return to, and a strict enforcement of, the segregation of former years will, in course of time, rid mankind once more and forever of this the most loathsome of diseases.

It is stated² that “Kunsamo, a little town in Finland, was for a long time a small but obstinate focus of leprosy. Sixteen deaths from that disease occurred there between 1774 and 1800, and twenty-two between 1801 and 1828. As the disease appeared to be spreading, it was determined, in 1801, to enforce isolation. A building was erected on a small uninhabited island in Lake Kitkajärvi, and the lepers were removed to that place. There they remained until 1845, when the hospital system was abolished, and the medical officer of the district was instructed to visit the lepers twice a year in their own houses, and to report on their condition to the authorities. These reports were made with regularity for twenty years, during which eleven cases of leprosy came under observation. After 1865 no further reports appear to have been presented, and in 1871 the medical officer reported he was unable to find any more cases of leprosy in Kunsamo. The stamping out, within a comparatively short period of time, of a disease which had probably smouldered on for centuries, may be commended to the attention of the opponents of segregation of leprosy.”

¹ American Cyclopædia, vol. x.

² Brit. Med. Journ., Dec. 19, 1891.

Taché¹ writes: "Since the establishment of a lazaretto, in 1844, leprosy has been more or less kept in check in New Brunswick; and for several years past, especially during the last few years, it has undergone a notable diminution. The check and the decrease are in ratio with the more or less prompt resort to the lazaretto. Segregation is, in my opinion, the cause of the diminution of the disease."

Blanc² thinks communities "may rid themselves of this most loathsome, repulsive, and unclean disease, by rigid segregation;" implying thereby a lazaretto as a State institution, wherein lepers shall be properly cared for and interdicted all outside communication involving personal contact.

Münch,³ being a "contagionist," naturally considers "that the only means for eradicating the disease is the isolation of lepers." He asserts that "isolation of lepers in a given locality stamps out leprosy," and cites many instances in southern Russia, in substantiation of his assertion.

Hellat,⁴ member and founder of the Chief Committee for Stamping-out Leprosy, in the Baltic provinces of Russia, finds, in the theory of infection, "the way pointed out by which we may arrive at the annihilation of the disease. As long," he writes, "as it must be looked upon as incurable, isolation alone can lead to the goal."

Goldschmidt⁵ says: "Complete isolation of all lepers and their families is the only reliable measure in order to quickly and totally eradicate the contagion . . . and ultimately making this loathsome disease completely disappear."

Wheeler⁶ thinks leprosy "can be eradicated by separating the sexes in the asylums."

Roose⁷ believes "the rigid system of isolation in vogue in Norway will, in a few years, work complete extinction of the disease" in that country.

Bouchard⁸ declares: "Whenever and wherever man has wished to do so, he has been able to liberate himself from the ravages of leprosy, and that it may be entirely extinguished by proper isolation."

Hansen⁹ says: "There can hardly be any doubt that segregation is the only right way, at least, after our experience here in Norway," for stamping out leprosy.

"There are grounds for hope for the diminution and even ultimate extermination of 'leprosy' in most parts of the world."¹⁰

There are those—men of experience in the management of leprosy, capable of forming correct conclusions concerning the disease—who deny that leprosy can be exterminated by segregation; but to particularize their opinions here would but add length to this already too lengthy article, without contributing correspondingly to its interest.

¹ Loc. cit.

² Loc. cit.

³ Loc. cit.

⁴ Loc. cit.

⁵ Loc. cit.

⁶ Loc. cit.

⁷ Loc. cit.

⁸ Loc. cit.

⁹ Loc. cit.

¹⁰ Editorial, Medical News, March 7, 1891.

Although contradictory on many important points relating to the "nature of leprosy," it is believed that a proper appreciation of the facts and opinions recorded on the foregoing pages warrant, with reasonable certainty, the following conclusions:

1. That leprosy is a specific disease, due to the presence of the lepra bacilli.
2. That leprosy is influenced by race, climate, soil, food, etc., only in so far as these environments tend to enervation on the one hand, or to physical well-being on the other.
3. That experiments have not demonstrated leprosy to be inoculable on man or beast.
4. That leprosy is hereditary.
5. That leprosy is contagious, infectious, and communicable, under conditions not yet understood.
6. That leprosy is both mitigable and curable.
7. That chaulmoogra oil is a drug of unquestionable value in the treatment of leprosy.
8. That leprosy may be completely eradicated from the list of human ills.

A STUDY OF METHODS OF OBSTETRIC INSTRUCTION.

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A GLANCE over the whole historical period of medicine distinguishes three great epochs: first, that lasting from Hippocrates to Galen—about 600 years; second, that lasting from Galen to Paracelsus—about 1300 years; and third, that of modern times—about 400 years. During the first epoch rational methods of observation and of study, and a true scientific spirit, brought the art of medicine to a high degree of development. During the second epoch medicine slipped back, under the influence of the eclectic methodism of Galen, into a craft for mystics and superstitious priests. Finally, in modern times, medicine has made a renewed progress on a scientific basis of clinical observation and of rational study.

The science and art of obstetrics have passed through the same three stages. Midwifery, as taught in the schools of Greece, and later in those of the Roman world, reached a higher plane, as judged by modern standards, than did its sister arts, medicine and surgery. But in the Dark Ages it sank below the other branches of medicine. The gathered

knowledge and experience of years were forgotten, and the art of obstetrics became the trade of midwifery, and was followed exclusively by ignorant and superstitious women. Midwives had existed practically always, and probably always will exist, and there is no reason inherent in the class which can produce a Marie Lachapelle—no reason why midwives should not practise their profession to the benefit of their patients and to the good of the human race. In modern times obstetrics has been raised again to a plane level with that of medicine and surgery. It and its kindred branch, gynecology, have made very material advances above the conditions that prevailed two or even one hundred years ago.

Among the primitive peoples who gained a livelihood by hunting and by waging war upon their neighbors, the most frequent demands for aid to assist the individual in a medical way were in times of peace undoubtedly of an obstetrical nature. The surgery of wounds would hold a place second only to midwifery, and in times of war might even take precedence, while pathological surgery and the great domain of internal medicine were products of a later advance toward civilization.

In the real progress that has been made in the science and art of medicine in the past fifty years surgery has outstripped all other branches. But following closely, if not, indeed, surpassing surgery in point of progress, gynecology has grown from the merest nothing to be an ideal of aggressive and progressive medicine. Obstetrics lost its primitive pre-eminence before medical history began, not because it became less important, but because other branches developed and demanded equal consideration. To-day obstetrics is a science and an art which shares with surgery the advances gained by the discoveries of anæsthetics and of the aseptic treatment of wounds. Neither surgery nor gynecology requires more nicety and exactness in solving their various mechanical, practical, and theoretical problems of diagnosis and of treatment than does obstetrics in its every-day necessities. Obstetrics is surgical, and in the best sense of the word it is gynecological, and it is more—it is medical. The pregnant and puerperal state may be complicated by any medical disease whatever, and certain of these are, in this relation, strictly obstetrical.

Numerous pleas for the blending of obstetrics with gynecology have been made recently, but obstetrics has been treated always as a secondary matter to gynecology, and but few writers plead for better facilities for teaching and learning the art of midwifery. And yet any gynecological surgeon will acknowledge that the vast majority of the diseases of women coming under his care follow parturition as complication or as sequela. Nevertheless, normal labor, so called, is looked upon by most medical men as something too trivial to demand their time or study. It is true that a large percentage of pregnancies term-

inates favorably to both mother and child; the strain put upon the generative organs by pregnancy and parturition is counterbalanced by the healing art of Nature. Unless the complications arising in the remaining small percentage of cases are serious but little attention is given them by either patient or physician, and lacerations of the cervix and perineum are passed over unnoticed, while displacements and subinvolutions of the uterus are not even appreciated until in later years the woman's existence has become unbearable, and she applies to the gynecologist for aid. The true relationship of obstetrics to gynecology is one of prevention and prophylaxis. Gynecology would be a minor branch to day if the same pains were taken to instruct students in obstetrics as are given to the teaching of surgery, for example. Gynecology and obstetrics should be bound together, or, rather, they should be one, but in this amalgamation obstetrics should take the lead and gynecology should become the secondary and dependent part. Any complication consequent upon a confinement should be recognized, not after the lapse of months, or perhaps years, but immediately the placenta is born the obstetrician should see that all the organs and their functions return to their normal condition.

To accomplish any reform in the practice of this important subdivision of truly preventive medicine it is necessary first to awaken a general interest in routine work in the art; and secondly, to secure to the general practitioner a more thorough knowledge of the science of obstetrics. The standard of obstetric practice should be, and it can be, raised to such a point that gynecological cases may come from unavoidable causes, and not from the ignorance and neglect of obstetric practitioners.

The most fruitful soil to work upon is the undergraduate, and we will now consider the various methods of teaching at present in vogue.

Medical instruction can be divided into two classes: the theoretical, or that of the science, and the practical, or that of the art, of medicine. Theoretical instruction includes the method by didactic lectures, that by reading of text-books, and the method of recitations. The student acquires knowledge in the first by listening to a systematic statement of the subject treated of, and in the second, by reading the same from a printed page. In the recitation this process is reversed, and an opportunity is given the student to express in his own words the ideas that he has gained from a course of reading or of lectures, or from both. In the recitation the student comes into personal touch with the instructor and derives an advantage from immediate and personal criticism which is impossible in reading or in listening to lectures. Practical instruction is conducted by means of "clinical lectures," in which the professor discusses certain patients before a class, and by means of "practical courses" which are a kind of "clinical recitation." In these courses the student himself questions and examines the patient and then dis-

cusses the case with the instructor. Practical courses can be given either in the wards of a hospital or in a dispensary (the "Poliklinik" of the Germans). In general, it is found best to combine hospital and dispensary instruction in the same course, because of the very different kinds of diseases to be found in each—in one, all bed patients; in the other, only those who are able to be out of doors.

Obstetric instruction is conducted on the same general lines, and theoretical lectures, text books and recitations all hold their important place in a well-organized system of obstetric teaching. Instruction at the bedside in hospitals and in out-patient services has also been brought to a high degree of development, although, as will be seen later on, all countries and all schools do not possess equal facilities for teaching midwifery in a practical way. It is as true of obstetrics as of any branch of medicine, that if the best results are to be obtained, no one of these several methods of instruction can take the place of any one of the others. It has been claimed that an out-patient service had no advantage over a hospital-ward service, because all obstetric patients are, of necessity, bed patients, and, therefore, of the same kind. It has also been claimed that a distinct disadvantage rests in such a service, because less personal supervision can be given the student by an instructor in an out-patient service. The refutation of the first objection is well outlined in the *Lancet*, for September 23, 1893,¹ where obstetric teaching in England is discussed editorially, as follows:

The question is sometimes raised as to whether it is better for a student to attend his case in the outdoor maternity department connected with his medical school, or that he should migrate to one of the lying-in hospitals for the purpose. Each system has its advantages. In the former case he is left largely to his own devices, and the necessity of thinking for himself is obviously of great educational value, if he starts with a fair theoretical knowledge. On the other hand, in a lying-in hospital this sense of responsibility is more or less absent, and though he may in a given time see more cases he may not improbably play no more important rôle than that of a spectator, and consequently be little prepared to act on his own resources in the emergencies that will surely be met with afterward in practice. The advantages of both systems may, perhaps, in the future be combined . . . it would certainly be a great advantage for students to see some cases attended in hospital before commencing attendance on patients at their own homes; but attendance in hospital should not take the place of work in the outdoor department, as in no other way is the faculty of self-reliance so likely to become developed.

The second objection, that students receive too little instruction in out-patient work, can be overcome by supplying a careful system of observing cases, with sufficient instructors to direct the work of the pupils. Just as thorough instruction and supervision can be given in a tenement as in a hospital ward, although a larger staff and an expenditure of more time may be demanded by the "polyclinic" system. A

¹ *Lancet*, 1893, vol. ii., No. 13.

combination of both systems will most advantageously prepare a student for the practice of obstetrics.

We will now consider in how far different countries fulfil the requirements for giving instruction in obstetrics.

The obstetrical institutions of France are all under government control. Medical students are taught in the wards of the lying-in hospitals, both those that are directly under the control of the Faculty and also those that are independent of the schools of medicine. These hospitals have out-patient departments, which are conducted by midwives specially appointed by the government. Each midwife reserves from her domain certain rooms, not exceeding three in number, for the reception of those patients who may be sent to her. Only cases which will probably run a normal course are thus referred.¹ Certain general hospitals have obstetric out-patient departments likewise run by special midwives. There has been at least one practical obstetric school in Paris for students of medicine ever since the opening of the one in connection with the Hotel Dieu, in 1720.² At present the regular obstetric course of the Faculty of Paris lasts one month, and consists of the following courses:³

1. Course of twenty-five lessons, in part theoretical lectures, in part practical exercises on the obstetric manikin.

2. Two lectures are given each week by the chief of clinic on cases of dystocia or other cases of pathological interest occurring in the service.

3. A clinical demonstration of any foetal malformation is given to the students whenever possible.

4. A public obstetric clinic is held twice a week in the amphitheatre.

5. All parturients are delivered by the students under the direction of skilled assistants.

6. The professor is accompanied each morning on his rounds by all the students. The latter are questioned concerning their work of the past twenty-four hours. The cases recently delivered or actually in labor are reviewed and criticised.

7. All the babies born during the week are vaccinated by the students.

The official "law" under which the above course is required is the following rule of the Medical Faculty of Paris, passed in March, 1891: " . . . each student must take a course in one of the obstetrical clinics of the faculty. The duration of the course is one month, and the student must himself deliver two women during that time." In addition to this required course, the attending obstetricians at the hospitals other than the Faculty clinics, the so-called *Accoucheurs des*

¹ Pinard: "Du Fonctionnement de la Maternité de Lareboisière," etc., Paris, 1887.

² Puschmann: "Geschichte des klinischen Unterrichts," *Klinisches Jahrbuch*, i., 1889.

³ Lepage: "Fonctionnement de la Maison d'Accouchements Baudelocque," *Clinique de la Faculté*, Paris, 1892, 1893, 1894.

Hôpitaux, give private instruction to any students who may apply. It is therefore possible for students to supplement the regular course of instruction by work with special teachers who are paid a fee by the student. Such a course of two and a half months' duration is outlined by Budin¹ as follows:

a. Course of theoretical lessons, including obstetric operations and manipulations on a manikin, is given by an assistant professor.

b. Extra lectures on laboratory work in its clinical application to obstetrics are given by the chief of the laboratories of histology, microbiology, and chemistry.

c. All labors are attended by the students, who write the histories; also pregnant women are examined by them. This course is under the supervision of an assistant.

d. Daily clinical instruction is given in the wards, with criticism of the written histories and oral examination of the students by the professor himself.

e. Work in laboratories is open to advanced students.

f. Most capable students are sent out to assist the midwives in complicated cases occurring in the out-patient service.

The instruction of midwives in France is very thorough and is carried on in all of the lying-in hospitals. Practical courses for midwives had been given in Paris for some time before the founding of the first obstetric school in 1720. After the course of instruction certain of the midwives enter private practice for themselves; others attach themselves to the out-patient departments of the various hospitals, and are paid by the government. Although certain courses have always, since 1720, been open to medical students, it is only within the last few years that they have had equal facilities with the midwife students to work in the obstetric hospitals of France.

This system of instruction has called forth criticism from various French writers,² who object to its limitations and who claim that the courses of instruction given by the *Accoucheurs des Hôpitaux* should be accepted by the Faculty as equivalent to the courses at the Faculty clinics. These critics compare the French with German methods, and draw conclusions unfavorable to France. Lejars³ thus sums up the German method: "The right to teach is awarded as freely as possible, with the single reservation that an official control is kept with a strict-

¹ Budin: "La nouvelle Maternité de la Charité et l'Enseignement obstétrical" (Leçon d'ouverture du Cours faite le 29. October, 1891). *Le Bulletin Médicale*, 1891, v.

² Champétier de Ribes, Doléris, et Budin: "Rapport fait à la Société des Accoucheurs des Hôpitaux au nom d'une Commission" (Budin, rapporteur), *Archives de Tocologie et de Gynécologie*, 1891, xviii. Verrier: "De la nécessité de l'Enseignement pratique de l'Obstétrique par la création de Cliniques libres et disséminées et par l'organisation de la Policlinique," *Nouvelles Archives d'Obstétrique et de Gynécologie*, 1886, i.

³ Lejars: "l'Enseignement de la Chirurgie et de l'Anatomie dans les Universités de Langue Allemande," *Le Progrès Médical*, 1888, 1889, viii. ix.

ness sufficient to insure a guarantee" (of the character of the course given). These various criticisms have led the authorities to increase the requirements for the Doctor's degree. The Conseil de Surveillance adopted, in June, 1892, the plan for reform in medical teaching as suggested by M. Brouardel, the dean of the Faculty. Article I. of this plan states, among other things, that "During the first two years of the course the students must be connected with the general services of medicine and of surgery. During three months of the third year the students must be connected with the services of obstetrics."¹ The principal improvements in the system of obstetric teaching in France are thus outlined by Ribemont-Dessaignes and Lepage in the preface of their new text-book:² "The teaching of obstetrics in France has taken on a remarkable development during the last few years—the formation of midwifery services in many Parisian hospitals, the transformation by the Faculty of the chair of theoretical obstetrics into a chair of clinical obstetrics, the requirement from all candidates for the Doctor's degree of a definite course of work, having increased the facilities for study, to the great advantage of the students."

From the standpoint of medical instruction, Germany and Austria are one. The instruction in obstetrics is given universally in these countries in a so-called "Frauenklinik," which is a hospital devoted to all that is "specifically peculiar to physiological and to pathological woman."³ The first of these "woman's hospitals" was founded in Göttingen in 1751, and similar institutions were added to nearly all the "schools" in the German-speaking world during the fifty years following. The system of instruction consists of the following courses:

- a. Course of theoretical lectures, given by the professor.
- b. Touch course on pregnant women, given by the first assistant under direction and personal supervision of the professor himself. These two courses should be finished before taking the remaining work.
- c. Practical midwifery course includes the personal care of labor cases and the keeping of the histories of the same. These labors are conducted under the personal charge of an assistant.
- d. Clinical lecture, given daily by the professor. The written histories are taken up and criticised, and, when possible, obstetric operations are done before the class, and complications of puerperium and of pregnancy are shown.

e. Obstetric Poliklinik, the out-patient department, renders assistance to midwives in complicated cases occurring in their private practice. The subsequent care of such cases is left to the midwife. An assistant

¹ Doléris: "L'Enseignement de la Gynécologie en France," *Nouvelles Archives d'Obstétrique et de Gynécologie*, 1892, vii.

² Ribemont-Dessaignes et Lepage: *Précis d'Obstétrique*, Paris, 1893.

³ Hoffmeier: "Ueber den Unterricht in den Kliniken für Geburtshülfe und Frauenkrankungen," *Klinisches Jahrbuch*, iv., 1892.

is detailed to do these operations, and he is assisted by one or two of the advanced students.

f. Operation course on the manikin is being neglected in the larger "kliniken." Such a course is still given in the smaller ones.

This system requires of the individual student about two hours daily during two semesters, except when he is on actual labor duty or on the "poliklinik," when all his time is consumed. He is required to give enough time to such duties to allow him to attend to at least four cases of labor. As a matter of fact, many students do more work than this minimum required for the State examination.

The instruction of midwives in Germany is good, and is carried on in some of the "Frauenkliniken" side by side with the teaching of medical students; others of these hospitals are exclusively devoted to the midwives. The course of instruction is modelled on the same general plans on which the students of medicine are taught, except that the whole time of these pupil midwives is given up to the study of midwifery. In a plea for absolute uniformity in these courses Hermann W. Freund¹ draws up the following details:

1. Instruction should last at least nine months—better one year.
2. The general use of a single text-book should be required.
3. Instruction in antiseptis and in the observation and care of normal labors should be considered the principal factor, and the chief weight of the examination should be placed on this.
4. The proper course to pursue with difficult cases, and the methods of antiseptis in private practice should be learned by instruction in "polyclinics," out-patient departments.
5. Instruction on the manikin should be restricted to the smallest possible limits. Version should not be taught.

The most neglected branch of instruction in Germany is the theoretical, and, owing especially to the expressed opinion of no less an authority than Billroth,² the theoretical lecture has in some universities been entirely discarded.

The machinery by which obstetric instruction is given in England consists of lying-in hospitals, with usually an out-patient department attached and of out-patient departments connected with the general hospitals, which, as a rule, do not take obstetric in-patients. The majority of the lying-in hospitals and their out-patient departments are entirely concerned with the teaching of midwives and monthly nurses; in some of them, however, the medical student is received as a pupil. Most of the practical instruction of medical students is carried on

¹ Freund: "Die Entwicklung der Deutschen Geburtshilfe aus der Hebammenkunst," Klinisches Jahrbuch, 111, 1891.

² Billroth: "Lehren und Lernen der medicinischen Wissenschaften an den Universitäten der Deutschen Nation." Wien, 1876.

in the out-patient "lying-in charities" of the general hospitals. The system of instruction has consisted of:

I. Course of theoretical lectures.

II. Practical course in which the student is required to attend from six to thirty cases, according to the licensing body to which he proposes to apply.

Most students receive a greater credit from their practical course than the maximum required by any licensing board. The course of theoretical lectures varies in length from three to six months, and is very generally the latter. The practical course usually lasts one month, and includes the examination of pregnant women as well as the care of parturients and puerperæ.

There have been many criticisms of this system by various writers in the English journals. Dr. Wm. L. Reid,¹ Physician to the Glasgow Maternity Hospital, objects to the system because the majority of students take their midwifery lectures in their fourth winter, while they take their practical courses during their second or third summer or autumn; because, further, while some read for the latter, others do not, but "trust to first seeing a case with a student who has already attended one or two cases." This critic has been in Berlin, where he was pleased with the methods of Karl Schroeder, and the following attempt to adapt German methods to the English system is interesting. Reid gives the following ideal course of instruction:

Systematic course first, then practical course. The student should call once or twice a day at a lying-in hospital during a fixed period, until he has watched six cases pass off in the labor-room under the care of the house surgeon or head nurse. At this stage, also, he should practise palpation, learn to pass the catheter, and with great precautions be taught diagnosis by touch. He should then, along with another student, be sent to outdoor cases, each case being visited during or soon after labor by the outdoor surgeon. He ought to attend a dozen such, sending for the district physician when anything beyond the ordinary is observed. A clinical lecture should be given three times a week during the summer, or both summer and winter, and all the students should find it to their interest to attend. These lectures ought to be purely clinical, and refer to the cases which the students are seeing along with the physicians every forenoon in the wards. When the outdoor or district physician is called to a case, he should attend the next clinical lecture, sending the lecturer a short note of the facts beforehand. The students who attended should be asked to give an account of the case from beginning to end, and the lecturer should ask questions of them or other members of the class, and make a running commentary. In case of doubt as to fact, the physician who had consulted with the students would be then and there referred to.

Dr. Robert R. Rentoul,² writing four years later, points out the lack of uniformity in the requirements for medical students, varying from

¹ Reid: "The Clinical Teaching of Midwifery and the Diseases of Women," Edinburgh Medical Journal, 1886, xxxii.

² Rentoul: "The Training of the Medical Student in Midwifery." *Lancet*, 1891, i.

nothing at all at Oxford to that of a six months' theoretical course and thirty labors, as required by the Royal College of Physicians of Ireland. More in detail these requirements are shown in the following table:

Name of examining body.	Lectures on midwifery, etc.	No. of labors required.
Royal College of Physicians and Surgeons, Eng.	3 months.	20
Society of Apothecaries (London)	3 "	20
University of London	1 course.	20
" " Oxford	0	0
" " Cambridge	1 course.	20
" " Durham	3 months.	20
Victoria University	6 "	20
Royal Coll. Surg. and Apoth. Hall, Ireland	6 "	30
Royal Coll. Phys. and Surg., Ireland	6 "	30
Royal University, Ireland	6 "	20
University of Dublin	6 "	Not stated.
Royal Coll. Phys. and Surg. Edin., and Fac. Phys. and Surg. Glasgow	3 "	6
University of Edinburgh	6 "	6
" " Glasgow	6 "	12
" " Aberdeen	3 "	6
" " St. Andrews	3 "	6

This writer states that midwives receive a more thorough instruction, and suggests these reforms: First, that lying-in hospitals should have paid district medical officers, who would each have a senior pupil under his immediate charge, and, secondly, "each student should be required to attend for three months indoor practice of a lying-in hospital or to have been present at not less than twelve confinements, at least three of which he should have conducted personally under the direct supervision of a registered practitioner." Finally, a recent editorial in the *Lancet*,¹ already quoted from, discusses this matter in the same spirit. The certificate required by the examining boards can be obtained by service in the out-patient department of one of the general hospital medical schools, or from any legally qualified practitioner to whom the student may act as an assistant, or thirdly, by becoming a resident pupil in a lying-in hospital. After showing the errors of giving too little instruction, which can so easily creep into an out-patient service, the article continues:

Of late years, at many of our schools the system has been greatly altered. It is for the most part, we believe, no longer possible for a student to have his name placed on the list of maternity pupils on the strength of a merely perfunctory attendance on a course of midwifery lectures. He is required to show that he has profited by it, and, in some schools at all events, students are not allowed to attend their cases till they have satisfied the obstetric physician in charge of the maternity department by the test of actual examination that they have acquired a sufficient knowledge of elementary midwifery, and more especially of that part of it relating to the observance of antiseptic principles.

¹ *Lancet*, loc. cit.

The growing tendency in England to combine teaching in the wards of a hospital with work in an out-patient department is shown by the following statement:

The experiment that is about to be tried at St. Mary's Hospital, of establishing lying-in wards for the reception of lying-in women as in-patients, will therefore be watched with much interest, and should it prove successful, as we trust it may, a similar plan will no doubt be generally adopted by the other medical schools.

In the remaining countries of Europe similar systems of teaching are carried out. Russia, Hungary, Switzerland, and more recently Italy, are very largely under the influence of Germany and Austria, and the German methods of accurate observation and of strict attention to detail have been more or less completely and successfully transplanted to the rest of Europe.

In this country the medical schools and most hospitals are not supported by the Government, and the intimate relationship that exists in Continental Europe between the universities and hospitals, both being Government institutions, is not possible here. Our schools are private corporations, like the universities of England. Unlike the English schools of medicine, however, they possess no great hospitals, and any plan of clinical instruction proposed by the Faculty must be subject to the approval of the separate Board of Trustees who may at the moment control the hospital in which it is the good fortune of the particular professor involved to hold the position of attending physician. All the medical schools of this country conduct a more or less complete out-patient or dispensary service, and the richer institutions have buildings especially devoted to this important department. Bedside instruction and general clinical lectures are also given by the vast majority of professors of practice and of surgery in some neighboring hospital; and such fact is very much to the credit of the trustees of those hospitals, for they share in no way the fees of the students.

The system of obstetric teaching varies very much in different localities. In some States there is as yet no examination at all required of candidates for a license to practise, but the possessor of any degree of Doctor of Medicine is given such a permit upon the simple payment of a registration fee. In other States an examination is now required, but in no State does the law require more than a theoretical test of the applicant's ability to manage scientifically a case of midwifery. The States having thus neglected to enforce any practical obstetric training from their qualified physicians, all progress in this direction has been left to the medical schools, and every advance has resulted from competition between rival institutions.

The course of theoretical lectures as given in our best medical schools leaves nothing to be desired, neither in its supply of diagrams and

models nor in its collections of museum specimens. The best text-books by American and English authors, and good translations of the most recent German books, are also in the hands of our students. In addition, a good system of recitations either forms a part of the regular course or is sought by the student in a private arrangement between himself and his instructor. It is in the matter of practical obstetric work that our schools are weak. The nearest approach to such work given in the large majority of our schools is a course on the obstetrical manikins of Schultze and of Budin. A very complete and carefully detailed series of lessons on these manikins is now almost universally given; that described by Edgar¹ is a very good example of them all. But such instruction is really only theoretical, and can never educate the sense of touch to differentiate the many phases of the pregnant and puerperal state. The proper delicacy of perception can only be procured by the frequently-repeated examination of obstetric cases in all the stages of labor and of the pregnant condition. The manikin has already been classed with old-fashioned methods by the teachers of the most progressive medical country, Germany, especially by those who command the use of a numerous *clientèle* of patients.

In all the large cities of the United States there are a sufficient number of lying-in institutions to more than care for the patients who apply; but the number of these which give any instruction to medical students is small indeed. Out-patient departments devoted to obstetrics are much less common than maternity hospitals, but they are a recent development, and most of them were started for the main purpose of giving clinical instruction. In New York City, for example, there are at least thirteen institutions which have a lying-in department or which are wholly devoted to such work, and only five of these give any instruction whatever. Four out of five instruct the students of a single college only. Most lying-in hospitals give a very satisfactory course of practical work to nurses who come from the great training-schools of the general hospitals, but the future physician is sadly neglected. In American medical schools, the system of instruction in obstetrics reserves no place for the clinical lecture nor for the frequent criticism by the professor of work done and recorded by the student, and only exceptionally is there any provision for the student personally to conduct cases of labor or to examine pregnant women or to watch a patient and her baby through the puerperal period.

There is no instruction open to midwives in the United States, and it is left entirely to the local boards of health whether they will accept the registration fee of any particular applicant. This country is more than a century behind Europe in its lack of control of the midwives

¹ Edgar: "The Manikin in the Teaching of Practical Obstetrics." New York Medical Journal, 1890, lli.

who practise in our great cities. During 1892 there were 67.39 stillbirths to every 1000 of puerperal cases in New York City; in the report of the Board of Health for that year, Dr. John T. Nagle,¹ the Register of Records, comments on this fact thus:

Schools for instructing midwives seem to be essential in this city More adequate measures (*i. e.*, more than afforded at present by the Maternity hospitals and kindred institutions) are needed in this direction, and it would seem that if they (such institutions) combined to form a large Maternity hospital, in connection with a school that would give theoretical and practical instruction in obstetrics, it would be a desirable measure and supply a necessary want.

The medical profession has escaped from a similar degeneration and lack of development only by the educational trips to Europe of some of its individual members, during which they have acquired all that was good in the countries visited. There has arisen in consequence a popular feeling that a trip abroad is a necessary ending to perfect a medical education. And in fact, the number of English-speaking students who collect each year in Vienna has led some of the "privat-docents" of that city to give practical courses, in which the instruction is conducted wholly in the English language. Many writers in our journals call attention to the advantages of the obstetric courses in Dublin, Prague, or other European medical centres,² but few have anything to record concerning the establishment of similar methods in this country. There are some notable exceptions to this rule of general mediocrity in American methods of obstetric teaching. Dr. Rohé, of Baltimore,³ calls attention to the College of Physicians and Surgeons of that city as the pioneer medical school to found a lying in hospital for the principal purpose of giving instruction. This was in 1874, and this hospital consists now of both an in-patient and an out-patient department. In Philadelphia the same combination of hospital and dispensary has been in use since 1887, *cf.* Parvin.⁴ And Edward Reynolds⁵ has described in detail the methods of Harvard University, in connection with which schools the out-patient service of the Boston Lying in Hospital was established in 1881. In New York City there are three undergraduate medical colleges and one medical college for women. All of these require practical courses in obstetrics. Two of these medical colleges require such work only in out-patient service, while each of the two remaining institutions possess a special lying-in hospital, and their students are instructed exclusively in the wards of these hospitals. The

¹ Nagle: "Report to President of Health Board." City Record, February, 1894.

² Kelly: "The Opportunities Offered by Prague, Heidelberg, and Dublin to the American Medical Student," International Medical Magazine, 1893, ii.

³ Rohé: "The Practical Teaching of Obstetrics in the United States," Transactions of the American Association of Obstetricians and Gynecologists, 1890, iii.

⁴ Parvin: "The Necessity for Practical Obstetrics in the Course of Instruction given by Medical Schools," The College and Clinical Record, 1888, ix.

⁵ Reynolds: "Modern Methods in Teaching Clinical Obstetrics," Boston, 1889.

courses given are a great advance beyond the methods of a decade ago, and we simply offer the criticism that no one of them possesses the ideal combination of an in-patient and an out-patient service. Other schools have also improved the courses given in this department, but much remains to be accomplished. The facilities of learning practical midwifery in this country should be equal to those of any other; and it should be the boast of our schools that the only thing not taught here and to be learned better abroad is the German or the French language, and not any detail of the science or art of medicine.

If we were to outline an ideal course of obstetric teaching we would choose:

1. Theoretical lectures as given in the United States.
2. Recitation system as practised in the same.
3. Manikin course as given in France, Germany, and very generally in America.
4. Touch course on pregnant women as universally conducted in France and Germany, at present beginning to be used in the United States.
5. Practical work in hospital wards, not limited to simple observation, but each student actually to carry on the labors and their subsequent treatment under rigid supervision.
6. Clinical lecture on the same material as given in France and Germany, and almost absolutely neglected in America.
7. "Polyclinic" or out-patient department as carried on in England and partially introduced into the United States.

The general result to be gained is: First, as thorough a theoretical knowledge as possible by the first three theoretical courses just outlined above. Secondly, the student should receive as complete a practical application of this knowledge as may be by seeing experts conduct confinement cases. Then, by doing the same under expert direction in hospital wards, where every facility for cleanliness and nursing is at hand, his flagrant errors would be corrected and his unskilled hand begin to appreciate minute details. He should finally put in practice in the tenements, but under careful supervision, the principles he will have learned. This object should be accomplished by the four final practical courses of the ideal system already outlined.

The questions involved in any plan for instructing midwives are similar, but infinitely more difficult to answer. The deepest foundations on which to build up a system are absolutely wanting. The first help should and must come from the State. A law compelling midwives to give evidence of some little knowledge to the local boards of health would compel these women to seek an elementary education in midwifery. If the demand should thus be created the proper schools would soon follow. The raising of the standard of requirements for registration would then become a mere matter of subsequent detail.

REVIEWS.

A TEXT-BOOK OF DISEASES OF THE EAR AND ADJACENT ORGANS. By DR. ADAM POLITZER, Imperial-Royal Professor of Aural Therapeutics in the University of Vienna; Chief of the Imperial-Royal University Clinic for Diseases of the Ear in the General Hospital, Vienna. Translated into English from the third and revised German edition, by OSCAR DODD, M.D., Clinical Instructor in Diseases of the Eye and Ear, College of Physicians and Surgeons, Chicago. Edited by SIR WILLIAM DALBY, F.R.C.S., M.B., Consulting Aural Surgeon to St. George's Hospital, London. Octavo, pp. 748. Lea Brothers & Co., 1894.

It is more than ten years since the former English translation of Professor Politzer's text-book; and while that work comprised some of the improvements of the following German edition, its excellences have been far surpassed by the new presentation of the teachings of the Vienna master. He must always impress his students with the broad catholicity of his views and his combination of unceasing aggressive advance with sane conservatism of judgment. So it is to be expected that this work, largely re-written, should be a safe and elaborate guide into every part of otology.

The scheme of the work has been recast, with transposition of some chapters and sections into more systematic sequence; and the use of smaller type for the less important sections gives considerable economy of space and renders less conspicuous the large additions made. The series of illustrations, previously rich and notable, has been increased by seventy-five, with substitution of new and better for not a few of those before acceptable. Many of these are from the author's exquisite drawings for his *Dissection of the Organ of Hearing*; but we note with regret and some mortification that the reproductions in the English version are often decidedly inferior to the German.

The admirable anatomical chapter with which the work opens has been amplified in relation to the tympanic attic and other points of growing practical importance, and the physiology is similarly dealt with. The chapter on the tests of hearing has been entirely changed, and a very full, judicial presentation of the value of the tuning-fork for testing sound-conduction by air and by bone brings the matter fully up to date. He upholds the usual trustworthiness of Weber's and Rinne's tests, and cites all of the useful modifications, such as Gellé's "preSSIONS centripètes" and Bing's "entotic" method, including his own proof of the patulency of the Eustachian tube, when the tuning-fork sounding before the nose is more loudly heard on swallowing. Too much study can hardly be expended in this difficult field, where much remains to be elucidated, since thus only can proper classification of

cases be possible and the aggressive resort to surgical intervention become less empirical and more successful.

The clinical chapters upon disease of the auricle, external canal, and drumhead show minor changes and additions; but in those upon the catarrhal inflammation of the tympanum, especially of the chronic adhesive type, he embodies his important later anatomical and pathological studies as to the ossicles and fenestra of the labyrinth, which deserve the widest recognition and consideration. With the parallel studies of Blake, Bryant and others, they throw the most valuable light upon the subject, and point most clearly to the stapes and its connections as forming the keystone of the conducting apparatus and its lesions. The value, as well as the limitations of the long-tried methods of inflations, injections by catheter, and pneumatic massage, are well set forth, undisturbed by the tirades of reformers who have been offering us panaceas which they imagine to be new; but he enters fully into the question of operative interference, in which he has been one of the pioneers, as well as a critical follower of others, and decides that, while some of the measures are fully exploded, others can be regarded as justifiable experiments.

The suppurative diseases of the middle ear, with a threefold division into muco-purulent, acute purulent, and chronic, receive still fuller consideration than heretofore, with stress upon the "attic suppurations" and cholesteatoma formations. These are illustrated by most instructive new pictures, as well as by the wealth of previously published sketches. The peculiarities of the aural involvement in the various infectious diseases are treated at length, at the same time that due emphasis is laid upon the responsibility and the need for more adequate attention on the part of the general practitioner.

In the usual treatment syringing is given its deserved position of first importance; but the reviewer must earnestly protest against the temperature advised, $26-28^{\circ}\text{C.} = 78-82^{\circ}\text{F.}$ In no case should the fluid be below 100°F. —the probable temperature of an inflamed ear—while increase to 105° is generally pleasant. Above this we obtain the stimulating effect of the heat, securing a tonic application superior in the majority of cases to any of the medicinal additions which he cites. In the very obstinate chronic otorrhœas showing much mucous admixture he warmly recommends adding a few drops of "oil (not spirit) of turpentine." It is surprising to find, as in other European text-books, almost no reference to the peroxide of hydrogen as a cleansing agent; and the delicate cotton-carriers, much used here as a means of applying it and doing a hundred other valuable things, seem unknown. "I have never observed bad results from the use of boric powder," summarizes one side of the contention as to the dry treatment, while he shows the limits within which its use is to be commended. He is also in favor of the alcohol treatment, often adding boric or other medicaments, and still regards *tr. ferri chlorid.* as the most efficient cauterant to granulations.

Operative methods of dealing with the suppurative disease and its disastrous effects are considered in detail, and the opening of the attic by the removal of the Rivinian margin is advised when the process is limited to the external attic, unless the accompanying caries of the ossicles is extensive. He warns against removing the ossicles, if but slightly carious, when the hearing is fair, as it often is in the Shrapnell-perforation cases, but advises their excision when they are demonstrably

diseased beyond functioning or probable healing. He reserves to the severer cases Stake's method of combining the chiselling free of attic and antrum with extraction of the malleus and incus, doing the simpler operation as a first step in the others. In dealing with the acute inflammations of the mastoid he thinks that Wilde's incision may be occasionally useful, but only in the class of cases which generally do as well with the antiphlogistic measures. Of these he prefers cold mediate irrigation with Leiter's coil. In the cases resisting conservative methods, especially those occurring in influenza, he opens the bone as soon as any operative intervention is demanded. In many of the acute cases he has found only the cells toward the mastoid tip involved; so he condemns needless opening of the antrum, and operates lower down. In the chronic cases penetration to the antrum is more generally demanded, and he selects the area close behind the "spina supra meatum," and chisels carefully, layer by layer, until the pus-cavities have been opened and evacuated. A fruitless operation should not be carried deeper than 18 mm.; the external opening should be free, so as to give good access and view; irrigation and minute cleansing should be performed, and drainage secured by tube and packing. Exposure of dura and sinus should be avoided by careful operation, although not apt to be serious complications, and the procedure should be modified in accordance with the needs and limitations of the case.

The sections upon sinus thrombosis, brain-abscess, and other serious or fatal extensions of tympanic suppuration needed little change from their former completeness, but have been extended to comprise all that is latest and best as to the operative interventions in these matters. These procedures are minutely but concisely described, the chisel and mallet being preferred to the trephine; and the author speaks from considerable personal experience, as well as study, in giving the complications and results.

The section upon nasal disease is excellent but brief. Nasal work has been as often neglected by the aurist as overdone by the laryngologist, and between these extremes Politzer keeps a good middle course, and much sound teaching can be found in and between his lines.

The final chapter on the internal ear is well expanded to bring it fully to date, and with notes upon mutism, aids to hearing, and indices of literature and of the contents, round up what is the best expression in English of current otology.

The translating has been well done, but is not free from blunders, such as "*oblique* (low) position of the cerebral fossa," "the *feathered* (spring) probe of Lucas," the oval opening is *on an axis* (at right angles) with the curve of the catheter," "*axis* (crus) of the stapes." He retains such German words as *ambos*, sounding, and follows the original in giving the weight of the incus as 0.25 gm., instead of 0.025.

B. A. R.

A TEXT-BOOK OF THE DISEASES OF WOMEN. By HENRY J. GARRIGUES, A.M., M.D., Professor of Obstetrics in the New York Post-Graduate Medical School and Hospital; Gynecologist to St. Mark's Hospital, New York City; Gynecologist to the German Dispensary; Consulting Obstetric Surgeon to the New York Maternity Hospital, etc. Containing 310 engravings and colored plates. Pp. 690. Philadelphia: W. B. Saunders, 1894.

WE are glad to welcome another distinctively American work on gynecology by an author whose name is a synonym for candor, wide research, and scientific accuracy. A careful perusal of the book will convince the reader that his purpose, as set forth in the preface, "to write a practical work," has been clearly kept in view throughout. A glance at the copious footnotes alone shows how minute has been his study of current American literature, and is calculated to awaken no little pride in the fact that our countrymen have contributed so much to the progress of gynecology during the past fifteen years. The author's distinct aim to emphasize this fact will alone win for him a host of sympathetic readers.

The general arrangement of the book is as follows: Under a "general division" are included eight parts, the first three of which deal with development, anatomy, and physiology; separate chapters under the latter heading are devoted to puberty, menstruation and ovulation, copulation, fecundation, and the climacteric. It is hardly necessary to state that the chapter on anatomy (including seventy-eight pages) is a model of conciseness and accuracy, through which are interspersed many novel views and the results of the author's original investigations, as well as researches.

In the section on physiology considerable prominence is given to recent views on menstruation and ovulation. The writer believes that menstruation may persist after double oöphorectomy, even though no ovarian tissue has been left behind. We are glad to see that he regards the possible presence of a third ovary in these cases as problematical; Sutton positively denies the fact. Some criticism may be urged against such short chapters as those on copulation and fecundation (page 120), which might readily have been combined; the same peculiarity is noted elsewhere. The chapter on the climacteric is thoroughly practical and most useful to the student. The same comment applies to the succeeding section on etiology, which contains a large amount of information in a remarkably clear, though condensed, form.

Part V., on "Examinations in General," is lucid and complete, presenting just such information as the practical clinical teacher finds best adapted to post-graduate students. Part VI., on "Treatment," contains such a variety of subjects as to be a little confusing. We regret that it is not divided into several chapters treating of non surgical and surgical treatment, technique, and instruments. The local treatment recommended is wisely conservative. We hope some day to see the double-current catheter banished from the gynecologist's armamentarium. Fig. 147, representing the vaginal tampon *in situ*, is misleading, as it tends to give the beginner an erroneous idea with regard to the size and firmness of the tampon as described in the text. Under the paragraph

on tamponade of the uterus it would have been well to add the caution that the cervical canal should first be dilated. Undue space is devoted to a description of ligation of the uterine arteries, an operation which is somewhat out of place in this chapter, and one which we would advise none but an experienced surgeon to attempt.

The descriptions of operative technique, the preparation of the patient, sutures, etc., are clear and concise. Advanced surgeons may object to some of the writer's methods, especially to his preference for the use of antiseptic solutions during an operation. The cuts of instruments are good, though some are now a little antique (Figs. 170, 172, 173). The writer is not much in favor of combined operations, though his argument against the simultaneous performance of the cervical and perineal operations—fear of secondary hemorrhage or premature menstruation—is not borne out by practical experience. This chapter concludes with several pages on gynecological electro-therapeutics, in which careful directions are given with regard to the practical application of the different kinds of electricity.

Part VII., on "Abnormal Menstruation and Menorrhagia," is referred to apologetically in the preface as treating of symptoms rather than true pathological conditions. Nevertheless, we find much that is useful and instructive in the seven short chapters into which it is divided. Leucorrhœa forms a separate "part" by itself.

The "special division" comprises two-thirds of the book, including seven parts, thus divided: Part I. (eighteen chapters), "Diseases of the Vulva;" Part II. (four chapters), "Diseases of the Perineum;" Part III. (thirteen chapters), "Diseases of the Vagina." Following these are thirteen chapters, under Part IV., on diseases of the uterus, ten on affections of the tubes and ovaries, and a concluding section on "diseases of the pelvis," with an appendix on sterility. A mere review of the table of contents renders it evident that the entire field of pelvic diseases has been covered, down to the smallest details, in a scholarly and systematic manner. It is impossible to do more than to indicate briefly the author's general plan and to call attention to a few of the salient points which prove its usefulness as a modern text-book.

The various affections of the vulva are well treated, largely from a clinical standpoint. We note in passing that the writer leans to Morris's theory that adhesion of the preputium clitoridis is a cause of various reflex neuroses, and that (contrary to the position taken in other recent text-books) he does not regard lupus as identical with tuberculosis.

Chapter XVIII., on "Masturbation," is a useful contribution to a subject on which most writers show a curious reticence. We disapprove (in common with most gynecologists) of clitoridectomy, which the practical experience of every surgeon who has performed it since Baker Brown's day has shown to be, except in rare cases, a useless mutilation. Under "diseases" of the perineum (somewhat of a misnomer) are included descriptions of the various methods of perineorrhaphy (especially Emmet's), which are concise, but clear and intelligent to the general reader—a rare virtue in such articles. The influence of the author's wide obstetrical experience is brought to bear most happily in his studies of laceration of the perineum and its treatment, the result being distinctly better than if he had viewed the subject from a purely gynecological standpoint. He has certainly grasped the real idea of Emmet's opera-

tion better than most recent writers. The accompanying diagrams are especially helpful to the beginner.

Chapter II. (page 314), entitled "Garrulity of the Vulva" (including ten lines) spoils the effect of the preceding one. If worthy of mention at all, it is in no sense a "disease," being merely a symptom of relaxation of the vulva, as explained in the context. Coccygodynia is rather out of place in a section on injuries of the perineum; it is a question if any but surgical treatment is effective in this affection.

Under the sections on diseases of the vagina is included a chapter on the various fistulæ; nearly twenty pages are devoted to the latter subject, a number of plastic operations being described and figured. Of the one hundred and twenty-six pages which are assigned to diseases of the uterus, displacements and neoplasms claim fifty each. Laceration of the cervix receives careful attention, the author being evidently firmly convinced of the pathological importance of the lesion (especially its reflex phenomena), which recent authors are inclined to regard as trivial. We agree with the recommendation to operate in the *dorsal* position, which is a decided advantage when perineorrhaphy is performed simultaneously—a procedure that the author believes is "risky" (!). In Chapter IV., on "Metritis," the old stumbling-block of students appears—the confusing subdivision of the various inflammatory conditions according to their seat, into "acute" and "chronic" metritis, and of the former into "endometritis," "parenchymatous metritis," "cervicitis," and "endocervicitis," which is, of course, correct enough from an anatomical standpoint, but is none the less perplexing to the beginner. We hesitate to criticise such an accurate observer and experienced teacher, and our criticism must be understood as being made purely from a clinical point of view. We do not undertake to decide the vexed question of the propriety of describing so-called hyperplastic endometritis as a chronic inflammation, rather than an *end-process*. We also hold that "benign adenoma" is a distinct form of neoplasm, not to be confused with endometritis fungosa.

The chapter on displacements in every work on gynecology is in a certain sense an index of the author's originality and freedom from the influence of views which depend for their currency on their antiquity rather than their inherent reasonableness. Applying this test, it is a little disappointing to find that Dr. Garrigues, still retains, though not very enthusiastically, the venerable cuts of anteversion pessaries, instruments which we venture to say most American gynecologists now regard only as curiosities. The prophecy of Hart and Barbour, made ten years ago, has been fulfilled: "Probably in a few years, anteversion will cease to be considered among uterine displacements." In speaking of the surgical treatment of antelexion, the writer utters a timely caution with regard to the dangers of the intra-uterine stem—which he prefers to use, if at all, when the canal "re-contracts" after forcible dilatation. The section on retro-displacements covers the ground pretty thoroughly, including concise descriptions of the various recent operations for the cure of retroversion.

The operative treatment of uterine fibro-myomata is considered at length, the author showing a thorough familiarity with all the recent methods of extirpation and supra-vaginal amputation. Enucleation of large sessile tumors with the spoon-saw has been abandoned; it is a more than questionable procedure, even in the hands of an expert, and

the author properly emphasizes its dangers. Malignant disease of the uterus is well treated from a clinical standpoint.

Part V., on "Diseases of the Tubes," is well adapted to the needs of the student by reason of its clearness and general conservative tone. Some of the opinions expressed, as well as those quoted from other sources, have, it should be stated, been greatly modified during the past five years. The writer evidently does not subscribe to the modern view that true hæmatosalpinx is rare, except in connection with ectopic gestation. The operative technique is carefully described.

Part VI., including nearly a hundred pages, forms a complete monograph on diseases of the ovaries, which equals, if it does not exceed, the corresponding section in the best works on diseases of women. The portion devoted to ovarian cysts and ovariectomy is quite exhaustive, and will prove valuable to the most experienced reader.

The concluding section deals with affections of the pelvic peritoneum, including diseases and neoplasms of the ligaments and hæmatocele.

The table of contents and indices are unusually full and accurate, and the remarkable freedom of the text from typographical errors is characteristic of that minute, painstaking revision for which the author is noted. The general appearance of the book is pleasing and the illustrations, many of which are original, are clear and well chosen. It is in every sense a *safe* text-book to place in the hands of the student and general practitioner, while the style is so lucid, concise, and forcible that no one can misunderstand a single statement. When we have said this, and have added that the book reflects throughout the modest tone of true worth, we feel that we have described as well as we could have done in several pages a work in which we should feel a pride as the exponent of what our countrymen have accomplished in gynecology during the past decade, as well as a striking evidence that patient research and scientific accuracy are not confined to the Continent. We prophesy for Dr. Garrigues' book a popularity which will be as great and as well founded as are its intrinsic merits.

H. C. C.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS. With especial reference to the application of Remedial Measures to Disease and their Employment upon a Rational Basis. By HOBART AMORY HARE, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. With special chapters by DRs. G. E. DE SCHWEINITZ, EDWARD MARTIN, and BARTON C. HIRST. Fourth edition, thoroughly revised and much enlarged. Pp. xi., 740. Philadelphia: Lea Brothers & Co., 1894.

THE fourth edition of this work comes before us enlarged to the extent of forty-four pages, the more important changes being found in the part devoted to the consideration of drugs. The new sections added are: Boroglycerin, bromoform, chloralose, condurango, convallaria, duboisine, methyl and methylene-blue, naphtol, pyrogallol, solanum Carolinense, soya beans, starch, zinc, and sodium sulpho-carbolates, thallin, trichloracetic acid, trional and tetronal. Nor does this list comprise all the

additions, for changes are found upon almost every page. Errors in alphabetical arrangement and the duplications in the last and former editions have been corrected. In the part which treats of remedial measures other than drugs, enteroclysis, hypodermoclysis, intravenous injection, lavage, mineral springs, and climate, in addition to the subjects of the last edition, are considered. The treatment of various diseases has been modified and somewhat extended. The doses of medicines are now given in both the apothecaries' and the metric system. Although some of the omissions and inconsistencies to which notice was called in our review of the third edition have been corrected, others have not received attention. The statement that this edition "has been revised in such a way as to render it uniform with the new U. S. Pharmacopœia" is not strictly true, so far as nomenclature is concerned. The majority of names of chemicals follow the old instead of the new Pharmacopœia, *e. g.*, bromide of potassium for potassium bromide. Nor, indeed, is the author accurate in terms which are presumably intended to be precisely those of the Pharmacopœia, for on page 262 we find naphthalinum instead of naphthalinum, and on page 110 camphor monobromate and monobromate of camphor appear instead of monobromated camphor; adeps lanæ hydrosus should have been found alphabetically as such in place of lanolin (p. 232), and the same may be said of chirata for chiretta (p. 128) and of rhamus purshiana for cascara sagrada (p. 123). Some pharmacopœial drugs and preparations are omitted—for instance, viburnum. Errors in statement are infrequent, yet morrhual is said to be "a crystalline substance containing phosphorus, iodine, and bromine" (pp. 160 and 161), while, as a matter of fact, it owes its retivity to the cadaveric alkaloids of cod-liver oil. Incompleteness carely marks the treatment of a subject, but the mention of the pharmacopœial hydrastinine hydrochlorate (p. 205) should have been followed by a statement of the conditions for which it is employed. Tetanus does not require treatment "virtually identical" with that of strychnine poisoning (p. 648); in this section the recent literature should have been considered. On pages 170, 171, and 651, other preparations and methods of administering creosote might well have been stated. Cactus preparations (p. 102) to possess therapeutic value should be made from the green plant. Evidently the author believes that constipation is a symptom peculiar to women (p. 469), or else that massage is efficient only when applied by them, if one may judge from the use of the feminine noun. The proof-reading is excellent, an occasional error, as sparteine sulphide for sulphate (p. 678), being met with. Many prescriptions are written in full; it would undoubtedly be an improvement if all abbreviations were replaced by full terminations; the medical student should be correctly taught, so that in later life he may avoid careless abbreviations. On the whole, the book is a faithful portrayal of our present therapeutical knowledge; the diction, an occasional inelegant expression being excepted, is good. The alphabetical arrangement is not likely to commend itself to the average medical student, who probably will wish to know the relationship of drugs, as much as it will to the practitioner, who seeks to refresh his memory. As a work arranged alphabetically we regard it as an excellent example, and well meriting the favor with which it has been received by the profession.

R. W. W.

LES CENTRES CÉRÉBRAUX DE LA VISION ET L'APPAREIL NERVEUX VISUEL INTRA-CÉRÉBRAL. Par le DR. VIALET, Ancien Interne des Hôpitaux de Paris. Avec une Préface de M. le Dr. Déjérine, Professeur Agrégé à la Faculté, Médecin de l'Hospice de Bicêtre. Ouvrage orné de 90 figures dont 20 dans le texte et 70 en phototypie hors texte, par H. Gillet et Vialet. 8vo., pp. 355. Paris, 1893.

[THE CORTICAL CENTRES FOR VISION, ETC.]

THIS volume of more than three hundred and fifty pages practically presents the outcome of extended and most painstaking microscopical research amongst a number of previously reported clinical cases that had been most carefully studied at Bicêtre by Déjérine.

The first case was one of pure cortical hemianopsia, the field defect belonging to the left homonymous type. In this instance there was an old yellowish plaque of partial softening which was limited to the anterior fourth of the right cuneus. The second case was one of the same type, except that here the field-defect symptom was reversed. Microscopic section showed that the entire left cuneus was softened. The third, which was distinguished by Déjérine as a new form of word-blindness, under the category of "cécité verbale pure," was most interesting. This patient suffered from a defect which involved the right side of the visual field. Whilst unable to read or to write anything that was exposed to his eyes, he could write from dictation. In this case autopsy revealed an old plaque of degeneration in the base of the left cuneus, the posterior parts of the lingual and fusiform lobes, the internal temporo-occipital furrow and the border of the corpus callosum. The other two cases, which were cases of ordinary word-blindness with hemianopsia, exhibited lesions in the small secondary annectant convolution in the fissure between the first and the second occipital convolutions.

To this study the author has coupled a fair bibliography, with a brief recital of the salient points in each instance, of the most important cases in the literature of the subject that have been carried to autopsy. This portion of the work, which is given chronologically, is divided into two groupings. The first of these is where the gross macroscopic appearances of the lesions have been studied, and the second is where additional microscopic evidence has been furnished. In the first series, he enumerates some seventy-three cases which occurred from the year 1863 to the year 1889. In the second he finds but fifteen cases—these, in great part, being the classical ones of Von Monakow and Henschen.

The cortical centre for vision occupies all of the internal face; it is limited in front by the internal perpendicular fissure; above, by the superior border of the hemispheres; beneath, by the inferior border of the third occipital convolution; and behind, by the occipital pole. He believes that the centre of this visual area coincides with the calcarine fissure, and finds abundant reason to disapprove of the so-called secondary centres for space, light, and color.

In brief, it can be said of this work, that besides offering itself as a most valuable contribution to the working library of both the scientific neurologist and the medical ophthalmologist, it can be recommended to any experimental physiologist and practical pathologist in this line of research, as well worthy of perusal.

C. A. O.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

SPERMINUM (POEHL).

DR. BUBIS has made a very careful chemical, physiological, and therapeutic study of spermin, which according to Schreiner, has the formula C_2H_5N (Ladenburg and Abel, C_2H_4HN). This substance is not, however, any more identical with the Brown-Séguard testicular fluid than morphine is with opium, or atropine with belladonna. Investigation shows that this substance is not any more peculiar to the male (testicles) than to the female sexual organs (ovaries). Further, that it is found in the thyroid gland, pancreas, and spleen. It is quite likely that it is an element which is found in the entire lymphatic system of the body, and it has been found, although not in its purity, in the liver and brain. It has also been shown that this substance has a distinct influence upon the oxidation processes in the body, and that it increases the imperfect oxygenating power of the blood. Also, that when the oxygenating power of the blood is diminished by acids, this diminution is neutralized by spermin. Urinary analysis also shows that the intra-organic oxidation is increased, and also that the combination of leucomaines with the xanthine and the creatin-group is favored or that they are oxidized, and in both instances excreted in large amount. This destruction and increased excretion is likely to prevent much auto-intoxication. Laboratory experiments show that the reduction in manifestations which mark the activity of the cholera bacillus are wanting, and this statement is also true for culture of cholera nostras. Physiological experiments show that in mammals there are no symptoms of depression; it also acts as a stimulant in the sexual tract and increases the activity of the spinal cord. Although the drug has an anti-tetanic action, it cannot be employed as an antidote to strychnine because it can also increase tactile sensibility. In large doses it slows and strengthens the heart, but in most instances it is without influence upon the vascular system. The morphological elements of the blood are unchanged by its sub-

cutaneous injection. Therapeutically, it does not give rise to pain, nor to local reaction, on injection, and it gives a sensation of increase of strength. On the locomotory system it improves the gait, tremors, and rigidity, and other motor disturbances, and causes the pains of ataxia, of the head and loins, to cease. It relieves the attacks of angina pectoris, the cardiac pains and palpitations of neurasthenic girls, and alleviates the pain of sciatica, rheumatic pains in the hands and loins. It improves the visual and auditory capacity, although failures are reported. It may act as a hypnotic in neurasthenia, tabes, anæmia, spinal epilepsy, and hysterical manifestations. Upon muscular strength the dynamometer shows that it exerts a favorable influence. In tabes dorsalis it regulates bladder disturbances; in diseases of the spinal cord it cures incontinence. On the sexual system it increases its energy, not altogether through a specific action, but from its general tonic effect. It has relieved obstinate constipation due to various causes, as hemiplegia, marasmus senilis, and anæmia. It apparently increases the oxidation of nitrogenous material, and it may lessen the excretion of sugar in diabetes. In senile emphysema, cardiac weakness, it has caused œdema to disappear. Spermin has been employed in various conditions, neurasthenia, tabes dorsalis, cerebral and spinal diseases, syphilis and skin diseases, diabetes mellitus, phthisis and other pulmonary diseases, diseases of the heart, and poisonings, as chloroform. In all cases where a physiological tonic is indicated, and when oxidation processes must be aided, this remedy appears to be of value. It is probable that spermin is not the only ferment in the organism which is a protection against the outbreak of disease. The discovery and the study of these is for the future.—*St. Petersburger medicinische Wochenschrift*, 1894, Nos. 9, S. 73; 10, S. 83; 11, S. 93, and 12, S. 105.

THE DIET IN DISEASES OF THE STOMACH.

DR. H. LOETSCHER believes that the treatment of the patient should be based upon the consideration of his general condition and constitution. In the treatment of the disease the individual should not be lost sight of. A meat diet, care being taken in selection and cooking; fish, under the same limitations as to fats as for meat, with eggs next in order, are of great value. Fats are usually injurious because badly borne, giving rise to fermentation, and they are often found in the feces. In inflammatory conditions, atony, and dilatation, green vegetables are contra-indicated; in other conditions if intestinal catarrhs, usually present, are absent, they are not absolutely contra-indicated. An agreeable, easily digested vegetable, which is well borne by most stomachs, is mashed potatoes cooked with milk. The carbohydrates are important, but they need preliminary preparation to free the starch from the cellulose-capsule. So-called prepared foods have the advantage of requiring but ten to fifteen minutes' cooking in lean bouillon or milk in order to make a strong, tasty, and easily digestible soup. Fluids should be taken during the meal in limited quantities, in order not to increase the stomach contents, and not to dilute the gastric fluids. Black tea, taken at an appropriate time, has a soothing, refreshing effect upon the stomach and upon the nervous system if it is properly prepared. The amount should not be too large, nor the steeping last more than three or four minutes, so that too much tannin is

extracted. Of great importance is the greatest possible rest of the organ, not only in assisting the stomach, but as well by bodily rest.—*Correspondenzblatt für Schweizer Aerzte*, 1894, No. 9, S. 265.

A CONTRIBUTION TO THE STUDY OF PIPERAZINE.

DR. JOHN GORDON finds that the stronger solutions have a greater solvent power over uric acid calculi; but the difference is much less than might have been expected from the relative strength of the solutions. This is a point of clinical importance, since it is proved that the drug is not entirely oxidized in the body, but that a considerable amount is excreted unchanged and in a state to combine with uric acid in excess. Piperazine in strength of from 1 to 7½ per cent., in normal urines at a temperature of 102° F., has the property of dissolving uric acid calculi, and of disintegrating and rendering soft and pulpy the undissolved portion. The solvent action of this drug under similar circumstances is greater than of other substances, as borax, lithium citrate, sodium carbonate, and potassium citrate. Neither of these substances rendered the fragment of calculus soft and pulpy as did the piperazine.—*British Medical Journal*, 1894, No. 1746, p. 1291.

THE THERAPEUTIC ACTION OF MALAKIN.

DR. FERDINAND MERKEL reports eighteen cases upon which he has used this remedy. He has found it, as its name signifies, mild. Unpleasant symptoms, as tinnitus, headache, vertigo, loss of appetite, or delirium, were not noticed. The worst symptom was sweating, but this in many cases was completely absent. Upon the temperature it has an unmistakable influence, reducing it gently, slowly, and restraining it for a period of short duration; a lasting antipyretic effect was not observed in any case. As an anodyne it has rendered good service, although in intensity of therapeutic effect it does not bear comparison with antipyrine or phenacetin. As an anti-rheumatic it ranks with sodium salicylate and similar remedies in producing distinct improvement in swelling and painfulness of joints and muscles, yet in several cases, even in doses of from seventy-five to ninety grains, equally as well as the usual salicylic preparations, it may completely fail. In spite of this it is an agreeable remedy, often acting favorably in articular rheumatism, and, with the exception of sweating, free from any unpleasant symptoms. As an antipyretic and anodyne it acts slowly and mildly; if not with the promptness of other remedies, at least without their unpleasant effects; especially it does not have any injurious effect upon the stomach. Whether it is proper to recommend the drug in larger doses, and more rapidly following each other, as one is accustomed to do with sodium salicylate, is well worth further study. At present, however, it is four times as expensive as sodium salicylate, although it represents but 50 per cent. of salicyl aldehyde, and this gives not much encouragement for increased dosage. The dose varies from fifteen to sixty grains per day, which is best administered in capsules, as it is insoluble in water and with difficulty soluble in cold alcohol.—*Münchener medicinische Wochenschrift*, 1894, No. 17, S. 324.

THE THERAPEUTIC ACTION OF ORGANIC EXTRACTS.

DR. CHARLES FORBES, after a lengthy chemical trial of organic liquid extracts, has adopted a particular class of preparations of these extracts, viz., "tabloids." He believes that thyroid extract would also be useful in cerebral anæmia from various causes. There is a necessary differentiation of the various properties of these extracts which is yet to be made out, and we are justified, by the marked success gained in certain diseases, in experimenting with each of these extracts in whatsoever complaints we may judge it will afford us any chance of success. With reference to the use of spermin and ovarian extract, it is believed that both the testicle and ovary possess some function apart from the manufacture of semen and ova which has not yet been clearly described by the physiologists. An earnest plea is presented for more clinical observation, which is likely to lead to results highly beneficial to the human race.—*Medical Press and Circular*, 1894, No. 2875, p. 619.

TETANUS TREATED BY BEHRING'S SERUM.

DR. HANS DOERBLER reports a case of typical tetanus of moderate severity. The prognosis upon the eighth day was measurably favorable, yet upon the tenth day twelve drachms of serum was injected, which gave rise to a slight general reaction in the form of an elevation in temperature. Locally and in the general condition the injection appeared to have no dangerous effect. The conclusion very properly is that, on account of the lateness of the administration of the remedy and the favorable prognosis before its administration, no conclusion can be arrived at as to the effect of the remedy.—*Münchener medicinische Wochenschrift*, 1894, No. 15, S. 282.

THE BALNEO-MECHANICAL TREATMENT OF DISEASES OF THE HEART
(METHOD OF THE DRS. SCHOTT).

DR. G. PAGENSTECHE, from the double standpoint of a cured patient and an interested physician, presents a very careful analysis of this method. This treatment consists of the use of two agents: 1. Baths of sodium chloride of different concentrations. 2. Manual gymnastics (so called) of resistance. Internal medicine is sparingly used, but not altogether prohibited. The treatment is commenced with the baths, while gymnastics are made use of toward the end; the former being the curative agent, the latter to prevent relapses. The concentration of the bath varies from 0.5 to 3 per cent.; the duration from five to eight minutes, which is increased to fifteen or twenty toward the end of treatment. The temperature at the beginning is 95° F., which is gradually reduced to 80° or 82° F. All persons do not, however, bear these concentrated baths of low temperature; the nervous and anæmic patients are especially refractory. At times, when the concentration exceeds 2 per cent., or the temperature is lowered, in order to avoid the nervous excitation and physical depression, free carbon dioxide is added. This is a cutaneous excitant of the first rank, and counteracts the anæmic effect of the cold water, and it permits a still further lowering of the temperature of the bath. The free acid is produced by the action of hydrochloric acid upon sodium bicarbonate in salt water. The remarkable fact connected

with these baths is the lowering of the pulse-rate: at first the tension becomes greater and the breadth is diminished; after five to ten minutes it becomes broader, regular, soft, and finally full. The gymnastic treatment is borrowed from the Swedish school, and consists of: 1, passive movements; 2, active movements, divided into active movements, properly so called, and movements of resistance. The following rules guide the practice of gymnastics: 1. No movement should be executed twice in succession. 2. Each movement should be separated from the next by an interval of rest (ten to fifteen seconds). 3. Movements should be made with great slowness. 4. The patient should breathe in his ordinary rhythm during the execution of the movements. 5. The movement should be immediately suspended when the respiration becomes accelerated or interrupted. 6. The initial resistances should be minimal and increased only in proportion to the strength of the patient—never to fatigue. 7. The *séance* should never exceed thirty minutes, and should be ended as soon as the patient experiences fatigue, suffocation, or vertigo. 8. All muscles of the body should be successively put into action. The general therapeutic results are analogous to those obtained from digitalis, viz.: slowing of the pulse, increase of arterial pressure, regulation of the cardiac movements. Generalized arterial sclerosis and aneurisms are absolute indications to this form of treatment.—*Bulletin général de Thérapeutique*, 1894, 22e livr. p. 503.

THE TREATMENT OF NEURALGIA WITH ANALGEN.

MR. GEORGE FOY has made a clinical study of this substance, which rejoices in the name of ortho-æthoxy-ana-mono-benzoyl-amido-quinoline ($\text{NHOOC}_6\text{H}_5\text{H}$). It is a white crystalline powder, insoluble in water, soluble in acids, readily soluble in hot, and sparingly soluble in cold, alcohol. From experiments upon dogs it has been determined that it is non-toxic, and even when given in large doses the kidneys remain unaffected. The urine may become a cherry-red color, due to the action of the uric acid upon the separated benzoyl group of the analgen, but this is of no physiological or pathological importance. Neither blood, albumin, nor sugar has been found in the urine after its use. It has not given rise to tinnitus, fulness in the head, nausea, nor to a single case of rash. After an experience of two hundred cases, it is believed that the smallest effective dose for adults is ten grains, repeated in three hours; the largest dose was fifteen grains. A shorter interval—two hours—is still better. For rheumatism the effects are more marked if it is combined with sodium tartrate in drachm doses, or if its use is preceded by the old-fashioned black draught and blue pill. As an anti-neuralgic remedy it is a great gain and very welcome to the medical profession.—*Medical Press and Circular*, 1894, No. 2875, p. 620.

THE THERAPEUTIC VALUE OF VAGUS-COMPRESSION.

DR. DUBOIS quotes Quincke, that slowing of the pulse upon pressure on the carotid is a very constant phenomenon, equally in the healthy as in the sick. This pressure, it is more probable, results in a mechanical irritation of the trunk of the vagus, which lies behind and to the outside of the carotid. A single case is reported, the symptoms being dyspnoea and palpitation, and

paroxysmal tachycardia. These attacks occurred frequently and suddenly, and lasted from five to fifteen hours, and went on to severe collapse. Physical examination revealed nothing beyond an anæmia and a slight bronchial catarrh in a very nervous patient. During an attack the patient was pale, the pulse was above 140; small but regular. Within five seconds under vagus-compression it fell to 128, in five more to 96, and remained for several days at 88. Although but little can be deduced from a single case, this appeared to bear the clearness of a physiological experiment, and to be free from any doubt.—*Correspondenzblatt für Schweizer Aerzte*, 1894, No. 10, S. 297.

THE ELIMINATION OF URIC ACID BY DRY TURPENTINE VAPOR.

DR. BENOIT DU MARTOURET reports two observations which seem to show that the vapor has a distinct effect in increasing the elimination of uric acid, and upon this fact rests the explanation of the relief which arthritic, rheumatic, and gouty subjects experience under this treatment. The vaporizing apparatus maintains a constant and graduated heat, and should be distinguished from those baths which by their excessive heat present great danger of cerebral congestion. It is hoped by this method also to cure the pyelonephritis caused by calculus, and so to reduce its volume that the calculus may be evacuated *per vias naturales*.—*Lyon Médical*, 1894, No. 24, p. 217.

THE TREATMENT OF CYSTITIS.

M. LAVAUX believes several remedies to be of real value. Sodium bicarbonate in thirty to ninety grains is the remedy of choice when the inflammation is due to irritation, as from cantharides; it is absolutely contraindicated with ammoniacal urines. Sodium borate has a favorable action according to the doses which are employed; thirty grains seem to act as an alkali. In ninety grain doses it acts as a feeble antiseptic, and is of some value if the cystitis is one of vesical infection, but it is not well borne by some stomachs. Sodium benzoate, benzoic and boric acids are better borne, but appear to be but little more energetic than the last-mentioned remedy. More efficacious is salol, but it is a dangerous remedy, and can cause severe accidents. It should be prescribed in from thirty grains to two drachms, the latter being too great. It must be used in small doses if the patient suffers from renal lesions. The pure essence of yellow sandal is quite active in the cystitis of blennorrhœic origin, but it often is badly eliminated by the kidneys, which it may irritate; it frequently gives rise to renal pain and, indeed, it may aggravate the cystitis. One drachm to one and one-quarter drachms is a safe dose. Turpentine, even in acute conditions, may be of value, ten drops being a sufficient dose. Buchu is better borne by the stomach than tar, eucalyptus, or uva ursi. If mineral waters are used, those of feeble mineralization, as Evaux, are preferred, although in acute cases Vichy or Vals may be valuable. Pain is best relieved by direct anesthesia of the urethro-vesical mucous membrane. Morphine subcutaneously, opium with belladonna or gelsemine in suppository, chloral by the mouth, may be of value, but they are indirect methods. The direct method by lavage without catheter and anæsthesia of the mucous membrane, by cocaine hydro-

chlorate or nitrate, and antiseptics of the lower urinary tract, are those of choice. The objections to local treatment are obviated when strict antiseptics is obtained, and pain is not caused if the bladder is not distended. A warmed 2 per cent. solution of boric acid is unirritating.—*La Chirurgie contemporaine des Organes Génito-urinaires*, 1894, No. 5, p. 140.

RECTAL INJECTIONS OF CREOSOTE IN PHTHISIS.

DR. CH. ELOY presents the various formulas which have been proposed, considering as one of the best that of Tisné and Simon: Pure beechwood creosote 0.40, iodoform 0.005, salol 0.40, dissolved in pure olive oil, 10. The injection is to be made each day through a rectal tube, the patient being in the left lateral decubitus; the solution is to be warm; the injection must be made slowly, and carried as high as is possible. The absorption is rapid. When intestinal symptoms arise this method must be abandoned. No remedy is more difficult to manage than creosote, and the degree of tolerance is variable, even for the same individual.—*Journal des Praticiens*, 1894, No. 49, p. 559.

THERMODINE.

DR. SCHMITT describes this substance as occurring in white pointed crystals, without odor and almost tasteless, although upon trituration there is developed a special aromatic odor, and after some seconds, if a fragment is placed upon the tongue, a persistent bitter taste is perceived. It is slightly soluble in cold (1 : 2600), more easily in warm water (1 : 450); but readily in alcohol, ether, benzin, carbon disulphide, and chloroform. While physiological researches have demonstrated the harmlessness of doses, even relatively large, in healthy men, they have also determined its method of elimination. It is absorbed with the aid of the lactic acid of the stomach, is decomposed slowly in the economy into amidophenol, which is eliminated in the urine, probably also in the perspiration and possibly in the saliva. A small proportion, if the dose is large, may be eliminated unchanged. The dose employed at which anti-thermic effects have been manifest is between six and seven grains. On twenty-nine patients, suffering from typhoid fever, influenza, tuberculosis, articular rheumatism, and pneumonia, the effect was found to be a gradual fall of temperature, commencing generally within an hour after its administration; this fall is gradual, reaching its lowest point within about two hours. This point is retained up to the third or fourth hour, when the ascent takes place in the same regular and slow manner as the fall, and the initial degree is reached generally in from seven to nine hours after the administration of the drug. The extent of the fall of temperature depends somewhat upon the dose. Five grains in tuberculosis does not always give appreciable results. Eight grains are usually sufficient; tuberculosis is more easily influenced and with smaller doses than is typhoid fever, and pneumonic fever is less amenable to this drug. The pulse curve follows closely that of the temperature, although the pulse may be influenced later than the temperature as regards the diminution of the number of beats, but it is likely to become accelerated as soon as the temperature commences to rise. Sometimes the pulse-rate remains unchanged although there is a notable lowering of temperature. There have been no accidents in the use of this drug which

are worthy of record; no gastric disturbances, vomiting, cyanosis, nor collapse. Occasionally sweating, and more rarely chilly sensations, have been noted. The drug apparently does not modify the hæmoglobin. The remedy has been generally administered in the morning in a single dose, and the quantity has been from the amount above named up to (rarely) fifteen grains. In conclusion, it can be said that thermidine is an antipyretic without danger, constant in its action, but very slow in producing this effect, and its results are sufficiently prolonged. It presents certain advantages over phenacetine, although it is inferior to it in activity, and it is expensive.—*Les Nouveaux Remèdes*, 1894, No. 9, p. 194.

THE ACTION OF COLD UPON CHLOROTIC WOMEN.

DR. AUGUSTO MURRI has found that in chlorotic women the action of a lower external temperature is a disadvantage, while cold douches or sea-bathing is, in these same women, a valuable remedy. These patients, on the approach of winter, take to their beds and present the classical signs and symptoms of the disease, which the author terms winter chlorosis. These cases also show a tendency to relapse with each approach of the cold season. The beneficial results of cold baths in these cases is explained by the observations of Rovighi and Winternitz, which showed that these increased the number of red-blood globules, and the functional activity in the vasomotor apparatus is increased. This, then, explains the apparently paradoxical statement.—*Internationale klinische Rundschau*, 1894, Nos. 17, S. 593; 21, S. 756.

THE USE OF ERGOTINE IN PULMONARY TUBERCULOSIS.

DR. T. CROCQ has, in common with many other practitioners, made use of ergotine for the purpose of checking hæmoptysis. At times, believing that hemorrhage was likely to recur, he has used this remedy as a preventive. In such cases he has noticed that the expectoration and feelings of oppression were less and the general condition of the patient showed an improvement which was to be explained by the vaso-constrictor action of the drug, relieving the congested condition of the tissues. It also will check the inflammatory processes and, so long as it is well borne by the stomach, favor nutrition. Bonjean's ergotine is administered in from eight to sixty grains per day, in a mixture, or in pills, one and one-half to three and one-half grains, three or four times daily, or, finally, in subcutaneous injection, from eight to fifteen grains.—*Internationale klinische Rundschau*, 1894, No. 21, S. 745.

AN APPARATUS FOR NARCOSIS.

DR. VAJNA presents a glass apparatus in the form of a truncated cone, the facial extremity broader and furnished with a rubber edge which fits closely upon the face. The distal extremity is covered with flannel, which absorbs and prevents the evaporation of the substance used. It possesses the advantages of easy cleansing, its transparency permits constant inspection of the face, the evaporation of the anæsthetic is prevented, and economy secured; the desired proportion of air and anæsthetic vapor is secured, the anæsthetic cannot burn or otherwise injure the face, and it is applicable to all kinds of anæsthetics.—*Gazette hebdomadaire*, 1894, No. 21, p. 246.

MEDICINE.

UNDER THE CHARGE OF

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A CASE OF PERIODIC PARALYSIS OF FAMILY TYPE.

HIRSCH (*Deutsche medicinische Wochenschrift*, 1894, No. 34, p. 646) has reported the case of a man, twenty-six years old, who presented a peculiar form of palsy of transient duration and recurrent type, and whose mother had presented a similar disorder. No other members of the family were known to have suffered in the same way or from any other form of nervous disease. It could not be stated when the attacks began in the mother; at first they occurred once or twice a year, but later they took place rather regularly once in three months. The attacks consisted in the development of complete paralysis of almost all the muscles in the course of five or six hours, lasting on an average for twenty-four hours, and disappearing as suddenly as they set in. Only the facial muscles were said to have escaped. During the attack consciousness was fully preserved, and there was an absence of noteworthy pain, as well as of unpleasant sequelæ; there was, however, marked thirst. The personal history of the son was good and was free from venereal infection, alcoholism, excess in the use of tobacco, and malarial or other form of fever. The first attack occurred at the age of nineteen or twenty, when he noticed that the extremities gradually became heavy and stiff—first the arms and then the legs. The condition became so aggravated that the patient was compelled to go to bed. It disappeared at the end of twenty-four hours. For the succeeding four or five years the attacks were repeated once every year, being preceded for some days by a sense of heaviness and fatigue in the extremities. After the attack the patient felt as well as before, and was able to pursue his ordinary vocation as a waiter. At this time his first attack of distinct and well-marked paralysis occurred; this began, like the others, with a sense of heaviness in the extremities that rapidly progressed to complete paralysis of the muscles of the arms, legs, and trunk, the facial muscles escaping. The complete palsy lasted for twenty-four hours and then disappeared suddenly. During its continuance there were no other disturbances except intense thirst. After the attack the patient felt as if nothing unusual had occurred. For none of the attacks was there an obvious cause. The

patient was not neurotic, but, on the contrary, rather phlegmatic. He came under observation during an attack that occurred two months later. The onset was, as usual, attended with a sense of heaviness in the extremities, but on this occasion first appreciated in the legs, thence ascending. In the course of twelve or fourteen hours the patient was completely paralyzed. Consciousness was not in the least disturbed, and the patient spoke intelligently and without impediment. He complained of no pain, but only of a sense of discomfort from inability to move. The facial movements were all well performed, and the acuity of vision and of hearing was normal. The ocular movements were perfect and the pupils reacted to light. The head was held somewhat stiffly; it could neither be rotated nor flexed and extended. The muscles of the neck were relaxed, and passive movement was easily effected in all directions. The lower portion of the sternum was somewhat retracted; there was little movement of the chest in respiration. Physical examination revealed no lesion of the lungs. The area of cardiac dulness was increased; the first sound of the heart was impure and possibly attended with a murmur; the pulmonary second sound was accentuated. The pulse was regular and of moderate tension. The area of hepatic percussion dulness was somewhat increased; that of the spleen unchanged. The patient lay in the dorsal decubitus, and was unable to rise or to move from side to side. The upper and lower extremities were in a state of atonic paralysis. The idio-muscular irritability of the paralyzed muscles was preserved, though diminished. The various reflexes were absent. All forms of sensibility were unaffected. The functions of bladder and rectum were efficiently performed. The urine displayed no abnormality. There was increased thirst, though no excess of perspiration, and the temperature was normal. The electric reactions could not be studied. The patient slept well during the night, and on the following morning his condition was unchanged. He was given a bath at a temperature of 95° for half an hour. Somewhat later in the day he was able to make some lateral movements of the head. During the following night the patient was suddenly awakened and found that he was able to move all his extremities, and on the next morning he was able to go about as usual. The reflexes had also returned, while the pulmonary second sound of the heart was no longer accentuated and the area of cardiac percussion dulness had receded. The pulmonary excursus had distinctly increased, and the respiratory act was performed perfectly normally. The patient was lost to observation, but it was learned that during the following four months he had none of the severe attacks, although a number of minor attacks of weakness in the arms had occurred, but only after the use of alcoholics or tea.

THE RELATION OF VISCERAL DISEASE TO CUTANEOUS SENSORY AREAS.

HEAD (*Brain*, 1894, Part III, pp. 339-480) publishes the second part of his admirable and patient researches upon the areas of superficial tenderness associated with visceral disorders. The researches here communicated relate to the sensory and painful areas of the head and neck. These are again compared with the distribution of herpetic eruptions, and referred so far as possible to central nervous segments. The distribution is complicated, and can only be understood by a reference to facts of embryology and ontology.

Between migraine and other headaches, especially the headaches of gastric derangement and of eye-strain, Head establishes important differences:

Migraine.	Referred headache.
1. The pain follows areas differing fundamentally in distribution from those of referred pain.	1. The distribution of the pain follows the lines laid down in Chap. I. (of Head's treatise).
2. The pain is associated with intense deep tenderness.	2. The pain is accompanied by more or less intense superficial tenderness.
3. Movement of the head, or anything that produces it (laughing, going upstairs, etc.) causes an increase of pain.	3. Pressure relieves the pain, and the patient can go upstairs without much increase in the headache.
4. The headache may be preceded by visual phenomena of the highest order, such as scotoma, "fortification figures," etc.	4. The headache is never preceded by these highly developed visual phenomena, but may be accompanied by amblyopia or flashes of colored light.

There are certain parts which do not cause referred pain, because they belong to the surface-lining of the body. Such parts are the conjunctiva, the epithelium on the anterior layer of the cornea, and the external auditory meatus. The external auditory meatus is, on the contrary, a part to which pain may be referred. A second group of structures which tend to cause local and not referred pain, accompanied by local and deep tenderness, is formed by the external lining of the organs of the head. The periodontal membrane and the dura mater are included in this group.

The areas in which referred pain occurs in connection with visceral disease are divided and named by Head according to a scheme described, and are associated with areas of the body divided according to the nomenclature of his previous paper. The original treatise must be consulted for details, but the table following may be copied:

Area on body.	Associated area on scalp.	Organs in particular relation with these areas.
Cervical 3	Fronto-nasal (? rostral)	{ Apices of lungs, stomach, liver, aortic orifice (?)
" 4	"	
Dorsal 2	Mid-orbital	Lung, heart (ventricles), ascending arch of aorta.
" 3	"	Lung, heart (ventricles) arch of aorta.
" 4	Doubtful	Lung.
" 5	Fronto-temporal	Lung, heart (occasional).
" 6	"	Lower lobe of lungs, heart (auricles).
" 7	Temporal	Bases of lungs, heart (auricles), stomach (cardiac).
" 8	Vertical	Stomach, liver, upper part of small intestine.
" 9	Parietal	Stomach (pyloric end), upper part of small intestine.
" 10	Occipital	Liver, intestine, ovaries, testes.
" 11	"	Intestine, Fallopian tubes, uterus, bladder (contraction).
" 12	"	Intestine (colon), uterus, etc.

A "BRUIT DE DIABLE" IN THE ABDOMINAL VENA CAVA.

VERSTRAETEN (*Centralblatt für innere Medicin*, 1894, No. 32, p. 737) points out that in certain cases of anemia a well-defined venous hum is to be heard in the epigastrium in an area of from 1 to 2 sq. cm., just below the margin of the liver from $\frac{1}{2}$ to 1 cm. to the right of the median line. The sound is a continuous blowing one of varying intensity, sometimes musical and wavy and materially influenced by the respiratory and cardiac movements. It has not been found in very young anæmic children nor in the emaciated beyond sixty years of age. It is best developed in nervous, anæmic, emaciated adults, especially women, and in the course of chronic disease of the stomach, dyspepsias, diarrheas, and pulmonary tuberculosis. It has not been found in cases of cirrhosis of the liver. The stethoscope is necessary to elicit the phenomenon, and this is facilitated by gentle pressure. Like the venous hum in the neck, the sound is very variable; it is inconstant, and disappears and reappears without obvious cause. When present it can be suppressed by compression of the vena cava at the umbilicus. The abdominal bruit is often associated with a hum in the neck; but there is no constant relation between the two, either in intensity or coincidence. Its production and its intensity seem to be favored by excitement, inducing increased cardiac and circulatory activity. The sound may be heard both in the sitting and the semi-recumbent posture, as well as the horizontal position. It is almost always continuous and attended with systolic, or, more accurately, presystolic accentuations, occurring synchronously not with the ventricular systole but with the aricular diastole. The sound is influenced by the respiratory act, being intensified shortly after inspiration. Compression of the ascending vena cava to a degree that does not suppress the murmur causes a heightening of the pitch, the exacerbations only persisting as a whistling intermittent murmur. Tactile fremitus was not observed in connection with the abdominal "bruit de diable."

FATAL HEMORRHAGE FROM AN ANEURISM OF THE HEPATIC ARTERY
IN A CASE OF GALL-STONES.

M. B. SCHMIDT (*Deutsches Archiv für klin. Med.*, Band lii., Heft 5 u. 6, p. 536) reports the results of post-mortem examination in a case of A. Cahn's. The patient was a woman, aged forty years, who had for some time suffered with symptoms of gall-stones. Five weeks before death there was a moderate hemorrhage from the bowel with slight hemoptysis; a few days later more profuse bleeding, and the development of slight icterus. Bright-red blood was passed with stool, and three weeks before death another profuse hemorrhage was noted. A fourth severe hemorrhage was quickly followed by death. The intestinal canal was filled with fluid and clotted blood. No change in the mucous membrane was found from jejunum to rectum. Extensive peritoneal adhesions involved the duodenum, colon and gall-bladder. In the new tissue small abscesses were found, which did not, however, open into the gall-bladder. The blood appeared to have entered the intestine through three large perforations involving the attached portions of duodenum and gall-bladder. The largest, 1.5 cm. in diameter, began 2 cm. below

the pylorus; the second, irregular in shape, was 1.5 cm. lower; the third and smallest, about the same distance below the second; the first penetrated the apex, the last involved the base of the gall-bladder. Upon each of the three openings lay a gall-stone, and from the neighborhood of the stones upon light pressure blood flowed into the intestine from the gall-bladder, as likewise from the ductus choledochus, through the papilla, which lay about 2 cm. below the third perforation. Near the three stones a blood-filled ovoid sac, about 6 cm. long and 3 cm. in greatest diameter, overlay the gall-bladder, into which it opened by a perforation near the apex, in relation with an abnormal communication between the gall-bladder and the hepatic duct near the division of the latter; and here the lumen of the sac was continuous with that of a ring-shaped body, which blocked and dilated the hepatic duct, and overlay the abnormal opening described. At this place a circular opening 3 to 4 cm. in diameter was covered by a valve-like projection or ruffling of the mucous membrane; and this opening led directly into the right branch of the hepatic artery.

In the neighborhood of the projecting valve the lining membrane of the duct was roughened, and showed a number of small superficial ulcers. About 1 cm. nearer the duodenum two larger ulcers were found. The hepatic duct was much distended near the site of the perforation, but narrowed further on, and again widened, together with the common duct, near the duodenum. Above the aneurism the bile-ducts were but slightly dilated. The lumen of the hepatic artery was free from obstruction; the edges of the opening were smooth, while the arterial wall projected as the inner lining of the circular ruffle-like valve in the lumen of the hepatic duct. There was no arteriosclerosis. Microscopic examination showed nothing of arterial wall or other organized tissue either in the basal ring-shaped portion of the false aneurism or in the ovoid sac.

Schmidt finds records of but five cases of hepatic aneurism in which rupture and hemorrhage took place through the bile-ducts.

SURGERY.

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ILEO-COLOSTOMY.

AN interesting case of ileo-colostomy by means of Senn's method of lateral anastomosis modified by the use of prepared vegetable plates, is reported by v. BARACZ (*Centralbl. für Chir.*, July 7, 1894). The resected

portion, consisting of the cæcum and portions of the colon and ileum, was not removed, on account of adhesions and malignant involvement, but the ends were sutured, and it was left within the abdominal cavity without any external outlet. The author draws the following conclusions from the case: 1. In man the resected and closed portion of gut left within the abdomen produces very little or no excretion. 2. Therefore this method of procedure is not so harmful as has sometimes been supposed, and the bursting of the intestine from the collection of intestinal excreta is not to be feared. 3. This method is especially applicable to cases of intestinal obstruction due to invagination or malignant disease. He considers the method more rational than simple anastomosis, as it prevents the irritation of the diseased part by the passage of the intestinal contents over it. 4. Senn's method, modified by using prepared vegetable plates, is preferable, the prepared turnip plates never producing necrosis and perforation, as has occurred with bone plate not sufficiently decalcified.

THE OPERATIVE TREATMENT OF RUPTURED URETHRA.

DEANESLY (*The Practitioner*, July, 1894) points out the fact that rupture of the urethra occurs almost always in one of two situations: either in the immediate neighborhood of the bulb or in the membranous portion. If divided in front of the triangular ligament the classical symptoms follow. "When, however, the urethra is ruptured behind the triangular ligament in cases of fractured pelvis, extravasation occurs in the prevesical space between the bladder and the pubis, where a considerable quantity of urine may collect. This fact sometimes leads to a fallacy. A catheter is passed, following the roof of the urethra, and keeping the point strictly in the middle line. On depressing the handle between the legs the catheter enters a space in which it is freely movable from side to side, and from which five or six ounces of clear urine may be withdrawn. By the rectum the catheter feels exactly as if in the bladder, although it is in reality in the prevesical space." In regard to treatment the author believes that in all cases of rupture of the bulbous portion of the urethra, and also where a blow upon the perineum has produced free bleeding from the urethra, the latter should be exposed and examined, whether a catheter can be introduced or not. The catheter may prevent extravasation, but in no way prevents the formation of a most intractable stricture. If the urethra has been completely divided, the ends should be carefully and accurately sutured. The bruised or lacerated portion should be resected. The author advises the use of a non-absorbable suture—silkworm gut, horse-hair, or fine silver wire, the sutures to be removed later, the ends being left long for this purpose and brought out of the wound, or the wound may be left open. He does not use absorbable sutures on account of the liability to contamination of the wound by urine, which prevents their enclosure or absorption. The sutures should include the whole thickness of the urethra except the mucous membrane, and care should be taken not to fold the edges of this into the wound. Four sutures are usually enough. The perineal wound may be accurately sutured, the stitches including the bulbo-cavernosus muscle, or it may be left open. In cases where the rupture is only partial, the fibrous sheath remaining intact, the author would advise

a longitudinal incision, exploration, and a resection if much tissue is destroyed. Portions not exceeding one-half to three-quarters of an inch in length may be resected, the urethra being dissected sufficiently free from the corpora cavernosa to admit of approximation. In all cases a catheter should be passed into the bladder and tied in. He advises a soft India-rubber catheter, size No. 8 or 9 English.

TWO CASES OF CEREBRAL INJURY.

HEREHOLD (*Deutsche med. Wochenschr.*, 1894, No. 24) reports two interesting cases of cerebral injury. In the first case the patient, who was twenty-four years old, received a blow upon the head causing a compound fracture; no fragments were felt. Weakness of the left leg and arm came on thirty-six hours after the accident, thus precluding an immediate trephining. The paralysis, however did not disappear, and recurring spasms indicated a further involvement, and operation was determined upon. Instead of coagula, four splinters of bone were found with suppuration of the underlying portion of the brain, which was the superior frontal convolution at a considerable distance from the fissure of Rolando. The author explains the causation of the clinical symptoms by an infected meningo-encephalitis of the superior frontal convolution, caused by the bone fragments and producing an inflammatory œdema of the anterior central convolution. This he justifies by the fact that after the removal of the bone-fragments and the relief of the intra-cranial pressure the cramp and spasms were lessened in intensity. The paralysis in the leg lasted longer, showing that there was probably a circumscribed local area of meningo-encephalitis in that region. The presence of symptoms showing involvement of the sensory system emphasizes the presence of a centre of muscular sense in conjunction with the motor sense in the motor area.

The second case was a compound comminuted fracture with marked depression of the fragments. The fracture extended to the fissure of Rolando and the motor area in the region of the arm and leg centres. The leg recovered rapidly after operation, but the arm recovered more slowly, showing that there had been not only a compression but also a contusion of the brain. Trephining was immediately resorted to, and the patient recovered. The symptoms connected with the sensations of temperature and muscular sense shows that, as has been stated, the location of the muscular sense is in the same region as that of motion.

TUMORS OF THE MAXILLA OF PARADENTAL ORIGIN.

NOVÉ-JOSSERAND and BÉRARD (*Rev. de Chir.*, June, 1894), report an interesting case of a solid tumor of the left lower maxilla occurring in a woman, twenty-nine years of age, and in which their investigations led them to the diagnosis of an adamantine epithelioma. They also quote three other similar cases in which they find an identical clinical history, and which, after microscopical examination, seem to be similar in structure, and form together a distinct class constituting benign, solid tumors of paradental origin. The clinical picture shows a slow development, intra-osseous in origin, with a

tendency to break out on to the surface of the bone, the point of predilection being the angle of the jaw. Painful symptoms are absent; there is anæsthesia of the nerves in the locality. Although the differential diagnosis is easily made between malignant and benign tumors, it is not so easy between the solid tumors and the parodontal cysts, except when fluctuation is definitely made out, or where an exploratory puncture discloses fluid. This diagnosis has, however, little bearing upon the operative procedure in the case. The case is different when the operator comes upon a solid tumor which is hard to distinguish from malignant disease; if benign it requires only curetting, while more radical measures are needed for malignant disease. The clinical characteristics of the adamantine epithelioma are here of great value; it is more friable than a sarcoma; it does not involve the bony capsule, but is sharply limited by it, and there is to be found within the cavity a tooth more or less developed, which, however, it may require diligent search to find, but its presence clears the diagnosis and determines the operative procedure. The prognosis in these tumors is favorable, but perhaps not so favorable as in the case of cysts, and further study may make more radical measures of treatment necessary.

THE NEURALGIC OSTEITIS OF GOSSELIN.

BLOCH (*Rev. de Chir.*, July, 1894) from his observations of four cases upon which he operated—in one of which he found, on introducing into agar-gelatin osseous tissue which presented only a hyperæmic appearance, culture forms of staphylococcus pyogenes aureus, and albus in another—concludes that “the disease described by Gosselin under the name of osteitis of neuralgic form, has the same source as bone-abscess, is found in the same situations in individuals of the same age, and presents the same bacteriological forms. It follows that it is dependent directly on an infectious osteomyelitis the same as bone-abscess.” Although the two diseases are comparable, there is sufficient difference outside of their anatomical and physiological similarities in the course of the disease to make it possible to distinguish between them, and even to recognize in them two other classes, the subacute and the chronic, which this author believes are less malignant. The proof of this must be found in a case where the patient has the disease in one of the long bones and at such an age that the disease is near to the junction of the epiphysis and diaphysis whose cartilage has not lost its physiological activity; where the disease is of the subacute type, where at the operation no suppuration is found, but alterations pathological and appropriate to a neuralgic osteitis, and finally, where the presence of osteomyelitic microbes can be proven. Such a case came under the author's observation; it was an osteitis of the great trochanter of five weeks' duration, and in a patient fourteen years of age. This case, with the others, demonstrates, the author believes, his view that Gosselin's neuralgic osteitis is a true infectious osteomyelitis.

CONTRIBUTION TO SURGERY FOR THE RELIEF OF GALL-STONES.

KEHR, writing on the surgical treatment of gall-stones (*Deutsche Zeitschrift für Chirurgie*, 1894, Bd. xxxviii., Hefte 4 u. 5), refers to fifty-three cases, upon

whom he has performed eighty-one operations in the last three and one-half years. Of thirty-six patients upon whom he performed cholecystotomy for stone in one or two stages, there were no deaths. The production of a gall-bladder fistula is not a dangerous operation. In all of the cases a cure has resulted. In a single instance only a fistula remained, but this caused so little inconvenience that the patient did not care to have it closed.

As a result of his observations and experience the author has arrived at the following conclusions:

1. There are entirely too few operations for gall-stones; it is of the greatest importance that these operations should be done early.

2. Many patients with gall-stones do not belong at Carlsbad, but at a surgical clinic.

3. The public must be informed of the dangers attending the presence of gall-stones; the physician must not delay too long the necessary operation.

4. The course of the disease and the intensity of the pain often make operation imperative.

5. Operation may be very necessary, although there be no icterus, swelling of the liver, or tumor of the gall-bladder; also, the pains need not necessarily be typical gall-stone colic.

6. In long-standing stomach troubles, such as dilatation, and especially in so-called stomach cramps, one must not lose sight of the possibility of gall-stones and of the existence of hernia in the linea alba. Many patients are treated for stomach tumors who have gall-stones.

7. Riedel's tongue-shaped appendix is present in many cases of hydrops of the gall-bladder; it is not seldom mistaken for wandering kidney on the right side.

8. Gall-stone colic is frequently due to inflammation of the gall-bladder; the icterus that is combined with it is due to the swelling of the mucous membrane of the bile-ducts.

9. Adhesions, especially between the gall-bladder and the pyloric end of the stomach, cause colic-like pains, although the stones originally causing the trouble had passed a long time before.

10. For removing stones from the gall-bladder cholecystotomy is sufficient; if the proper technique is employed fistulæ will not remain.

11. Adhesions must be freed as far as possible.

12. The ideal method with its modifications is to be discarded.

13. The total extirpation of the gall-bladder is to be considered only on account of disease of its walls (carcinoma, ulcerations, etc.), and not on account of the stones that may be contained in it; in some instances in which the organ is small and shrunken, Riedel's or Lauenstein's method may be employed, and then cystectomy is indicated.

14. Stones in the common duct are to be removed by incision of the duct.

15. Cystic stones must, under certain conditions, be removed by incision of the gall-bladder.

16. The surgical attack is often less dangerous than the treatment by medicine—that is, the waiting and delay of operation.

17. I have not yet observed a recurrence.

18. Gall-stone operations must be executed in clinical institutions only.

19. Only those who are experienced in abdominal surgery should undertake gall-stone operations.

FURTHER COMMUNICATION ON THE TREATMENT OF SURGICAL
TUBERCULOSIS BY PASSIVE HYPERÆMIA.

BIER communicated to the "Twenty-third Congress der Deutschen Gesellschaft für Chirurgie zu Berlin" his latest observations on the treatment of surgical tuberculosis by passive hyperæmia (*Archiv für klin. Chirurgie*, 1894, Bd. xlviii., Heft 2). The observations now include one hundred and eighty tuberculous lesions occurring on one hundred and fifty-five individuals. In a case of sarcoma in the neighborhood of the knee, which was at first supposed to be tubercular osteitis, the tumor increased rapidly in size under this treatment. A case of lupus on the arm and leg of a child, supposed to be of tuberculous origin, became aggravated under the influence of passive hyperæmia. The administration of potassium iodide caused rapid healing of the lesions, which led to the diagnosis of specific lupus. This is confirmatory of former observations, that syphilitic lesions are made worse by passive hyperæmia.

Increased tendon reflexes decrease or disappear under passive hyperæmia. To this effect Bier ascribes the rapid improvement of contractions and the increased movability in inflamed joints after this treatment. Inflammations dependent upon staphylococci and streptococcus are unfavorably influenced by the artificial hyperæmia.

The result of this treatment on tuberculous joints is much more favorable if sinuses have not formed than if they already exist. Bier has observed in the former cases relief of pain, return of motion and function, and the granulations cicatrize. The effect on lesions which are discharging freely is, first, to increase the discharge, and, later, to cause its disappearance. Some of the cases are cured, and others result in cold abscesses, which are to be treated in the usual manner.

The treatment of tuberculosis of the bones does not differ from that applicable to joints. All of the cases treated had sinuses. In some the sinuses healed, but if they persisted even after the injection of Villate's solution, operation is proceeded with much sooner than in the cases affecting joints, as in the former the function of the member is not thereby interfered with, as is the case after excision of a joint. In tuberculous disease of the metacarpus and metatarsus, the author reports unsatisfactory results; in all other cases favorable results.

In tuberculosis of the sheaths of tendons, the behavior to passive hyperæmia is about the same as in the cases of joint disease. Some of the cases are cured, and others result in the formation of cold abscesses.

Five cases of tuberculosis of the testicle were treated by Bier's method. One case died of general tuberculosis and the others were much benefited.

Experiments were made on tuberculosis of the glands, without any practical result, owing to the difficulty of applying this treatment to the usual location of the glands.

In tuberculosis of the skin the results have been the most unfavorable.

In conclusion, Bier states that his method is not intended to displace recognized conservative methods of treatment, nor will it do away with excisions and amputations; but, in his opinion, it is one of the best of the conservative measures so far employed.

THE USE OF CELLULOID PLATES IN REPLACING BONE-DEFECTS.

VON FREY (*Wiener klin. Wochenschr.*, 1894, No. 3) in an interesting article describes in detail successful cases of the use of this material as a substitute for bone. After trephining and in injuries of the head he advises the use of a plate the shape of the defect in general, but overlapping it by about three-eighths of an inch on all sides; this should be placed subperiosteally over the defect, the periosteum being raised for about three-eighths of an inch about the margin of the bone-defect. The healing is without reaction, the plate is not absorbed, but its margin is covered over by a growth of new bone or callus, and there is no union with the covering of the brain, no protuberant callus, and, consequently, no irritation of the brain. He also reports its successful use in other regions, supplying the place of the superior maxillary, the floor of the orbital cavity, and the tracheal rings.

STRANGULATION OF MECKEL'S DIVERTICULUM CAUSED BY VOLVULUS OF THE ILEUM.

ELLIOT reports the following case (*Boston Medical and Surgical Journal*, vol. cxxx., No. 24), which is of particular interest on account of the question of diagnosis.

A man, aged thirty, was brought to the hospital after an illness of four days, during which time he complained of vomiting, chills, and abdominal pain. On admission to the hospital the temperature was 103.6°, the pulse 160, and the respiration 35. The abdomen was distended, tympanitic, and very tender, particularly to the right of and below the umbilicus. Under ether a large hard mass could be felt in this situation. The bowels had moved twice in the last forty-eight hours.

The case was thought to be one of appendicitis, and an incision was made vertically two inches inside of the anterior superior iliac spine. The appendix was found, however, to be entirely normal. Further examination disclosed toward the middle of the abdomen what appeared like a dilated and gangrenous hernia, but there was no mesentery present. It sprang from the lower part of the convex surface of the ileum, where it was tightly twisted, and extended upward through a dense mass of adhesions to the under surface of the umbilicus. It was then evident that the condition was a strangulated Meckel's diverticulum. It measured seven inches in length, and was of about the same calibre as the ileum. The diverticulum was removed, and the opening in the ileum closed with Lembert's sutures. The ileum was found twisted on itself at this point, partially obstructing the gut, and was held in this position by adhesions. The volvulus seemed to have been caused by the contraction of the mesentery due to an old adhesion.

The patient, already septic at the time of operation, died on the second day of septic peritonitis. The author states that the operation was the most difficult and perplexing one he had ever seen.

The case is important, first, because it impresses the fact that strangulation of Meckel's diverticulum is an occasional cause of acute peritonitis, and, second, because the diverticulum somewhat resembles the vermiform appendix, the former in some cases even having a mesentery. The symptoms of

affections of the two structures would be much the same. The presence of a tumor, and marked tenderness near the umbilicus, and the history of a discharge from the umbilicus, are both significant of the presence of the diverticulum. In either affection there is apt to be a history of previous attacks of pain.

The only treatment to be thought of for the condition under discussion is prompt laparotomy and removal of the inflamed or strangulated diverticulum. The special points to be observed are the careful stitching of the pedicle, as it often opens directly into the intestinal canal, and the careful ligature of the vessels, because the diverticulum is supplied by a branch of the mesenteric artery, which is the persistent omphalo-mesenteric artery, and may be of considerable size.

THE TONSILS AS A MEANS OF ENTRANCE FOR PYOGENIC MICRO-ORGANISMS.

BUSCHKE calls attention (*Deutsche Zeitschr. für Chirurgie*, 1894, Bd. xxxviii., Hefte 4 u. 5) to the fact that although suppurative processes have received considerable attention, and in many cases are well understood, still the point of entrance of the micro-organisms is in many cases uncertain. It is well known, for example, that following typhoid fever or pneumonia an osteomyelitis may result, the source of the disease being the typhoid bacillus or the pneumococcus. The bacterium coli commune is also capable, in diseased conditions of the intestinal walls, of escaping and causing suppurative processes. Thus it is possible for germs to enter the blood through the respiratory and alimentary tracts. Garré first pointed out that infection could occur through the skin and the adjacent mucous membranes. It is now conceded that micro-organisms are able to find lodgment in the skin, but a local inflammation is necessary before they can effect an entrance into the blood, which occurs through the medium of the lymphatics. The probability of connection between inflammatory affections of the tonsils and diseases of the deep-lying organs has been referred to by former authors. Ribbert concludes from his investigations that the mucous membrane of the mouth is an effective barrier to the entrance of micro-organisms, except where the epithelium is not *intact*, as the tonsil. Witzel advances the opinion that in acute rheumatism of the joints the tonsils may be the point of entrance of the disease. Kraske and Jordan have likewise attributed osteomyelitis to infection through the tonsils in certain cases.

The author describes several cases in which he attempts to show the connection between diseased tonsils and suppurative processes in the body. Bacteriological examinations showed the presence of streptococci and staphylococci in the crypts of the tonsils and in the blood, as well as in the suppurating focus.

On this ground Buschke expresses the following opinions:

1. That the tonsils may be the points of entrance for pyogenic micro-organisms; it is not necessary that ulceration or diphtheria should prepare the way for lodgment and multiplication of germs.
2. On the basis of experimental investigations it is probable that the tonsils play an important rôle as the means of entrance for pus-producing micro-

organisms, and certainly a more important one than the respiratory and alimentary tracts. Very probably the bacteria do not pass the tonsils without causing slight trouble, which in the majority of cases is unnoticed. The care of the mouth and throat is not only of local hygienic importance, but is also of value for the prevention of general disease.

OPHTHALMOLOGY.

UNDER THE CHARGE OF

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SCOPOLAMINE: A NEW MYDRIATIC.

RAEHLMANN (*Klinische Monatsblätter für Augenheilkunde*, xxxi., No. 2) called the attention of the profession to the alkaloid scopolamine, obtained from the roots of the *Scopolia Atropoides* and isomeric with atropine, hyoscyne, duboisine, and daturine. He claimed that it excelled any of these as a mydriatic and antiphlogistic; and that, while so strong in its mydriatic action, it had no untoward effects, causing no constitutional symptoms. He employed it as a mydriatic in a solution of one-fifth to one-tenth per cent., one grain or one-half grain to the fluidounce.

Since his publication it has been tested quite extensively by ophthalmic surgeons, a number of whom have published reports upon its action. In general, these agree that it has such mydriatic power as was originally claimed for it; but they fail to sustain the view that it was more free than other mydriatics from liability to produce constitutional effects. And while Professor Kobert, from some experiments on the lower animals, concluded that its general action on the nerve centres was the opposite of that of atropine, the symptoms observed after its use as a mydriatic all seem to indicate that its action on the nervous system is closely allied or identical with that of the previously known drugs of its class.

The present literature and experience regarding scopolamine, therefore, indicate that it is very closely allied to these drugs—if, indeed, it be not the same drug obtained from a new source.

HEMORRHAGIC IRITIS.

HEMORRHAGE in the course of iritis is not a very rare complication. M. TEILLAIS (*La Semaine Médicale*, Année xiv., No. 27) reports an experience with it including five cases. The first occurred in a patient the subject of

chronic alcoholism with vesical disease. In the second the iritis had occurred in connection with frontal herpes zoster in a patient free from history of rheumatism or syphilis. The third was the case of a woman in whom serous iritis occurred at the menopause. In the fourth patient, both alcoholic and syphilitic, three successive hemorrhages occurred in the course of the iritis; and the fifth case occurred in a subject of hæmophilia.

He concludes that hemorrhage into the anterior chamber complicating iritis is found at all ages and with the most varied constitutional conditions; and that it neither changes the character of the attack nor seriously retards the cure of inflammation. It should be considered as rather a benign complication, and there is no reason to give it an especial individuality to establish a separate distinct variety of hemorrhagic iritis.

MELANOTIC SARCOMA OF THE EYELID.

ZIMMERMAN (*Ophth. Rev.*, vol. xiii., No. 152) reports a case and collects five others. He finds the diagnosis is not easy, but rapidity of growth and the peculiar dark color, with no hemorrhage to account for it, are the main points; only microscopic examination will finally decide. The treatment is that of sarcoma elsewhere—early and complete excision. Operation in this locality presents no peculiar difficulty, and can usually be made thorough. The destruction of suspicious tissue by the cautery he believes to be important. Primary or secondary plastic operations will usually be required, either for cosmetic reasons or to preserve the integrity of the cornea.

OPERATION TO CORRECT ASTIGMATISM.

THE occurrence of a definite form of regular astigmatism, after operations involving an incision of sufficient length in the cornea, has been recognized since the time of Donders, and the possibility of utilizing the fact for the correction of congenital astigmatism has been considered.

Recently (*Archives of Ophthalmology*, xxiii., No. 1) BATES has suggested incisions of the cornea perpendicular to the most convex meridian, and claims that the amount of correction can be regulated by the number, depth, and location of the incisions; that the operation promises a permanent effect, and the danger to the eye is not so great as the danger from an iridectomy.

He reports two cases in which the operation was performed tentatively, and in one of which the patient's vision, without glasses, was improved.

INSANITY FOLLOWING A MYDRIATIC.

THE acute mental disturbance sometimes seen after the use of mydriatics in ordinary refraction work hints the possibility of precipitating serious mental disease by the same means.

DR. L. H. TAYLOR (*Annals of Ophth. and Otol.*, vol. iii., No. 3) reports a case in which this seems to have occurred. The strength of the solution of atropine used was 1:120, a drop of which was instilled in each eye three times daily. On the second day the patient became incoherent and excited, but subsequently the trouble took the form of melancholia. It is not im-

probable, however, that the occurrence of insanity was simply a coincidence, since the patient had been subject to great strain in nursing her mother who for some years had been insane, and at the same time doing work far beyond her strength.

OCULAR ANTISEPSIS.

DR. A. TROUSEAU (*La Presse Médicale*, Année ii., No. 19) reports an investigation made in twelve cases of cataract extraction in which the operation was performed immediately after thorough cleansing of the eye, in five cases with a solution of sublimate 1 : 2000, in five cases with a solution of cyanide of mercury 1 : 1500, and in two cases with distilled water. The results obtained in the way of healing were, with the sublimate, four perfect cures, one cure with some conjunctival catarrh and prolapse of the iris; with the cyanide two perfect cures, two with slight iritis and chemosis, one with more severe iritis and prolapse of the iris; with the distilled water the healing of one was perfect, and in the other there was only slight redness of the eye. Immediately after the sterilization in each case the conjunctiva was wiped with carefully sterilized cotton and the material obtained examined by bacteriological methods with the following results: Streptococci were found in both cases after the use of distilled water, in three of the cases after cyanide, and in two after the sublimate. White staphylococci were found in four cases after the cyanide, and in two cases after the sublimate.

He concludes that on the whole the sublimate solution is superior, being a better bactericide and less irritant than the solution of cyanide of mercury.

ETIOLOGY AND TREATMENT OF TRACHOMA.

DR. F. PIGNATARI (*Ophth. Review*, vol. xiii., No. 152) finds that in his daily practice (in Naples) eighty-five per cent. of cases of trachoma occur in what may be called lymphatic individuals. The gravest cases are almost invariably found in scrofulous and tuberculous subjects. This, he thinks, points to the dependence of trachoma on the lymphatic tendency. He has noted that the presence of diffused granulation is less common among those living in Paris than among the inhabitants of Naples and London. In the former city the majority of cases are of simple or mixed trachoma. This, he thinks, is due to the fact that in Paris even the poorer classes occupy upper stories of houses built in comparatively broad and airy streets, while in Naples and London ventilation and light are conspicuous by their absence. Among the members of one family those most seriously affected are those who live a greater part of their lives indoors.

A rational therapeutic system requires antiseptic local cure and internal treatment directed toward increasing the organic resistance of the tissue to the inroads of the disease. He advises for a local treatment applications of silver nitrate and other antiseptics, with pressure combined with scarification for the deeper infiltration.

TREATMENT OF DETACHED RETINA.

At the recent meeting of the American Ophthalmological Society, DR. C. S. BULL (*New York Med. Journ.*) reported his experience with thirty-eight

cases of this condition. He finds "the science and practice of ophthalmology have as yet discovered no better means for dealing with detachment of the retina than the old methods which have been advised and carried out for so many years, viz., rest on the back in bed, atropine, a bandage, and the internal administration of some drug which may induce absorption of the sub-retinal fluid.

The continued use of pilocarpine, either hypodermatically or by the mouth, may cause great prostration even in cases in which it is apparently well borne; and the desired effect may sometimes be produced by small doses of bicarbonate of sodium and iodide of potassium largely diluted with water."

In recent cases subconjunctival puncture of the sclera may do good, but the improvement is generally transient. Division of fixed membranous opacities in the vitreous causes but little reaction, and may do positive good, as it reduces the danger of extension of the detachment. Vascular opacities should not be disturbed. Division of the detached retina may be done in a quiet eye, and causes little or no reaction.

THE RELATION OF ERRORS OF REFRACTION TO EPILEPSY.

H. WORK DODD (*Brain*, part lxiv.) gives a tabulated report of 100 consecutive cases of epilepsy in which the state of the refraction was determined. And of 75 who were considered to need lenses, 52 carried out the treatment by wearing them. Of these, 13 had no recurrence of fits during periods varying from four months to one year, 3 remained unchanged, and 36 were improved. He notes that in only 23 cases was there any family history of fits, and that in 65 there was frontal headache of marked severity. The most notable error of refraction was astigmatism, which was present (over 0.25 D.) in 42 cases, as against 16 per cent. in normal eyes.

He concludes: Errors of refraction may excite epilepsy. The correction of the errors of refraction will, in combination with other treatment, in many cases cure or relieve the epileptic condition. In some cases, when the refraction error has been corrected the epilepsy will continue, generally in a modified form, in consequence of other irritation, even though the error of refraction may have been the exciting cause of the fits in the first instance. In every case of epilepsy, in addition to general treatment and the investigation of other organs, the eyes should be carefully examined under a mydriatic, with a view to correcting by proper spectacles any error of refraction that may exist.

GOUTY RETINITIS, CHORIO-RETINITIS, AND NEURO-RETINITIS.

C. S. BULL (*Transactions of the American Ophthalmological Society*, vol. vi. part iii.) reports cases with autopsies, and from his own observations and a survey of the literature of the subject, concludes:

In these diseases the changes in the fundus are always bilateral, though rarely symmetrical, in the two eyes. The degeneration in the walls of the blood-vessels and in the retina cause marked impairment of central vision, but little or no impairment of peripheral vision, and never end in blindness. The loss of central vision is always progressive up to a certain point, unless the cause

of the disease is recognized early and the case properly handled. Improvement of vision after the disease is established cannot be expected. Hemorrhages into the retina are rare, except in the beginning of the disease. Their absence later is probably due to the fact that the strength of the vascular wall is increased by the deposit, though its elasticity is diminished.

The most marked feature in the fundus is the development of the arterio-sclerosis and phlebo-sclerosis. This is seen by the ophthalmoscope in the vessels of the retina, and the microscope shows that the degeneration exists as well in the vessels of the choroid and optic nerve. Another most equally pathognomonic symptom is the peculiar yellowish granular exudation in the retina, located by the ophthalmoscope around the posterior pole of the eye, and generally leaving the macula intact, and proved by the microscope to be mainly in the nerve-fibre layer, though found in all the layers except that of the rods and cones. The changes in the optic-nerve fibres seem to be almost entirely intra ocular, and cannot be traced for any great distance back of the eyeball.

An extended discussion which followed the reading of Dr. Bull's paper showed that the conditions described were not rare, but it was not clear to many of the members that they should be regarded as gouty; the condition most constantly coincident with such ocular changes being one of general vascular degeneration.

THE SUBJECTIVE TEST FOR ASTIGMATISM.

F. C. HOTZ (*Annals of Ophthalmology and Otology*) utilizes the distortion of a point of light as seen in an eye that has regular astigmatism. A metal plate is placed before a window or gaslight. In the centre of the plate is a second plate, circular, capable of revolution around its centre, with two apertures, and an index which sweeps over a graduated arc of the fixed plate. The patient, on looking at the point of light, if astigmatic, sees each point as a line, these lines both having a certain direction. The plate is then revolved until the direction of the radius in which the apertures are situated and the index of the movable plate coincide with the direction of the lines, when the two lines will appear as parts of the same line. The index then shows one of the principal meridians of the astigmatism.

Generally the presence and direction of the astigmatism can be detected without the use of any lens, although they will be rendered most evident by placing before the eye a proper spherical lens.

Hotz finds that with such an instrument he has been able to detect the astigmatism in more than 92 per cent. of all cases, and even when the astigmatism was but 0.25 D., it was detected in nearly 85 per cent. of the cases. It requires but a moderate degree of visual acuteness and intelligence on the part of the patient to make it applicable, and he finds no reason to abandon this simple and more reliable instrument for the costly ophthalmometer.

OBSTETRICS.

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 A CASE OF AIR-EMBOLUS IN PLACENTA PRÆVIA.

HEUCK (*Zeitschrift für Geburtshülfe und Gynäkologie*, Bd. xxviii., H. 1) describes a case of air-embolus with fatal termination in a case of placenta prævia. The patient was admitted in labor, and the diagnosis of placenta prævia established. Under narcosis version was attempted, and a foot seized and brought down to the vulva. As soon as this occurred the woman had a violent pain and bore down hard; at the same time a thick stream of bloody water spurted from the vagina. She was brought lengthwise to the bed, when suddenly the pulse became imperceptible and the face slightly cyanotic. Breathing persisted, but less frequently than normal. Injections of camphorated ether were given, the chin depressed, and artificial respiration practised, but all in vain. The respiration became less and less frequent, marked cyanosis ensued, and death followed in about five minutes. At the autopsy, two hours post-mortem, on section of the right jugular vein, an air-bubble as large as a hazel-nut escaped. The great vessels of the heart were tied. The heart gave a tympanitic note, and on lifting it up one could see clearly through the thin walls of the right ventricle air-bubbles rising from deep within the heart. The right heart was opened under water, when air-bubbles escaped from it. The coronary arteries contained no air, and the heart's musculature and valves were normal. Lungs and pleuræ were sound. Air-bubbles were also found in the right spermatic (ovarian) vein. The unopened uterus was placed in alcohol and opened some weeks later. It contained a placenta prævia centralis, the principal part attached to the right and posterior wall. It was partially detached on the right side, but no large vessel-lumina were observed. The author concludes that it is improbable under the manipulations of version that air was pressed into the veins, but believes that this took place immediately after the version was complete. At the moment when the foot hung from the vagina a violent pain and gush of bloody water occurred, and *immediately* the radial pulse failed, while respiration persisted. It is believed that at this moment the air between the uterine wall and the detached surface of the placenta was pressed into the gaping lumina of the veins. Further, this air was, by the sudden lowering of abdominal pressure due to cessation of pain and bearing down, aspirated

into the spermatic (ovarian) vein, and thence into the vena cava and right heart. Three cases in the last six years occurring in this clinic (Universitäts Frauenklinik, Berlin) show that this accident is not so rare as many imagine.

THE HISTOLOGY OF THE HUMAN AMNION AND UMBILICAL CORD.

LANGE (*Zeitschr. für Geburtshilfe und Gynäkologie*, Bd. xxviii., H. 1) presents a contribution to the histological anatomy of the amnion and umbilical cord in the human embryo. His conclusions are as follows:

1. The epithelium of the amnion is not cubical or cylindrical, but a single layer of pavement epithelium.
2. The granulation of the dead amniotic epithelium does not depend on the presence of fat.
3. In the amniotic epithelium there are no open mouths of lymph passages. The pretended stomata are artificial, and arise through the rupture of degenerated mucous cells.
4. The umbilical epithelium is, as a rule, a three-, seldom four- or five-layered laminated epithelium, whose deep layer consists only of flat cells.
5. During embryonic life the differentiation into a laminated epithelium appears on the umbilical cord earlier than the division of the epithelium.
6. "Stomata" are not found in the epithelium of the umbilical cord.
7. The umbilical cord of a mature fœtus contains numerous elastic fibres within the connective tissue.
8. The cord contains no other lymph channels than the connective-tissue corpuscles of Virchow.
9. These capillary lymph channels are most probably susceptible of injection.
10. Between the epithelial cells of the cord can be found no branches of lymph channels.

ANATOMY AND PHYSIOLOGY OF THE CIRCULATION OF THE NEWBORN.

STRASSMANN (*Archiv für Gynäkologie*, Bd. xlv., H. 3) gives the results of his investigations concerning the anatomy and physiology of the circulation in the newborn. Briefly these may be tabulated as follows:

1. The explanations heretofore accepted as to the cause of the closure of the ductus arteriosus are not satisfactory:
 - a. Thrombosis is seldom found, and is pathological.
 - b. Self-closure by contraction of the duct is not demonstrated.
 - c. Changes of position of the thoracic organs with bending of the duct after inspiration has no anatomical basis.
 - d. The post-partum changes in the duct walls are neither peculiar nor characteristic, as they also occur in the umbilical vessels.
 - e. The impulses mentioned in *b* and *d* favor the definitive obliteration of the duct.
2. The closure of the duct comes instantly and mechanically.
3. The manner of entrance of the duct into the aorta makes possible such mechanical closure.
4. From the fifth month in the human fœtus a progressive development of

the angle made by the anterior wall of the duct at its entrance into the aorta forms a valvular duplication which closes the duct at the most favorable point, which is that at which the arch of the aorta becomes the descending part of the same. Similar conditions are found in foetal sheep, dogs, and cats.

5. The progressive differentiation between the pulmonary and aortic systems affords an example, as seen in the development of the valve at the foramen ovale.

6. In order to close the exit from the duct to the aorta, respiration is essential. Thereby the pressure in the right heart and pulmonalis sinks, and later rises in the left heart and in the aorta. Then the aortic orifice of the duct (already partially empty) is mechanically closed.

7. The closure does not happen—

a. If the breathing be insufficient.

b. If, by reason of premature breathing through aspiration of blood, the duct be overstretched.

c. If abnormal conditions of pressure obtain in the large vessels.

d. If the development of the duct be incomplete.

8. The finding of patency of the duct in later life without disturbance of the circulation is due to mechanical embarrassment of the aortic mouth.

9. A secondary patency of the duct arises from separation of the closed aortic orifice from the aorta, and the original closure is still demonstrable.

10. Attempts to inject with coagulated fluids confirm the closure of the duct.

11. As late as the eighth day the duct can be injected from the pulmonalis.

12. It can be injected from the aorta only in foetuses of defective development; in overstretched ducts, or by excessive pressure in the aorta.

13. Through overpressure from the aorta the duct can be filled only after distending all the arterial system, and then—

a. In the earliest days the duct-opening is forced apart; or,

b. In the second half of the first week the anterior duct wall is inverted.

14. The aortic part of the distended duct seems narrower than the pulmonary, because of the pressure on its walls from the aorta.

MENSTRUATION AND OVULATION.

LEOPOLD and MERONOFF (*Archiv für Gynäkologie*, Bd. xlv., H. 3) summarize as follows:

1. Menstruation is generally accompanied by ovulation, though it not infrequently occurs without the latter.

2. This periodical flow of blood depends on the presence of the ovary and of a sufficiently developed uterine mucous membrane—two factors without whose common action no typical outflow can occur; hence it does not depend on the maturity or rupture of a Graafian follicle. If either factor be wanting, no flow occurs, however sound the other may be.

3. If ovulation have occurred, it may generally be referred back to the time of the hemorrhage. It requires for its development a strong efflux of blood to the genital organs for several days, and forms then a typical corpus luteum.

4. Outside of the time of the four-weekly bleedings ovulation also occurs, but this is seldom under physiological conditions.

5. Ovulation and the formation of a typical corpus luteum may take place through determination of blood to an immature follicle.

6. Even at the time of senile atrophy of the ovary, normal follicles still occur, and these come to physiological eruption, forming a typical corpus luteum.

On the whole, menstruation is the more frequent; menstruation without ovulation the more seldom. It is certain that at the time of periodical hemorrhage ovulation can occur, even when no external bleeding is observed.

THE CARE OF THE NAVEL.

DOKTOR (*Archiv für Gynäkologie*, Bd. xlv., H. 3) reports his experience relative to the treatment of the umbilicus in newborn infants and the prevention of infections. In newborn infants the navel forms a columnar projection of the skin, on the top of which the cord is attached—a sharp line of demarcation, the navel ring, separating the cord from the skin. On its margin are numerous vessels that go to the border of Wharton's gelatin, but do not enter into it. When the cord is ligated its tissues lose their viability, and must separate and fall away, leaving the wound covered with a living structure.

We must regard the navel as a physiological wound of the abdomen of the newborn, its healing differing in no way from that of any other wound, the only peculiarity of the process being the topography of the wound.

In typical cases it heals by first intention. This small wound is specially liable to infection and resultant maladies, light or severe:

1. Because of its condition; it is not merely a wound of the abdominal skin, but also of its wall and in closest proximity to the abdominal membrane (peritoneum), which is very susceptible to infection.

2. The peculiarity that three great vessels lie free in this wound.

3. The third great factor tending to infection is the disproportionately large mass of dead tissue—the remains of the cord.

4. Again, this wound is peculiarly inclined to an excessive formation of granulations.

5. The frequency of development of anomalies and aberrations of the umbilicus* also predisposes it to disease.

According to Erös, 68 per cent. of umbilical wounds do not heal in a normal manner; and of these, 45 per cent. suffer from fever. How often these cases terminate fatally is not known.

In treating the navel the desire is to obtain healing without infection. The ordinary method is to simply ligate the cord some eight to ten centimetres from the body and wrap it in an oiled rag, after careful disinfection with sublimate solution, 1:1000, and then binding it to the abdomen with a bandage. At each bathing of the child the cord is washed, and if there be not much secretion a new bandage is applied, or a cotton wad is placed over the navel first. Too often cleanliness in the latter matter is neglected by the nurse. The author omitted the oiling of the rag in the above method, as it hindered mummification. The temperature was taken twice daily. Iodoform was applied to the wound, or, if needed, a weak carbolized wash. With the above treatment, 35 per cent. of cases had fever, and of these 16 per cent.

showed infection. The plan was then changed. The cord was removed as early as possible and all wetting omitted. The bandage was changed daily. After this, 25.8 per cent. showed a rise of temperature, and of these 10 per cent. had infection. Further improvement resulted when efforts were made to hasten mummification of the cord. Ligatures applied closely to the belly were next tried, the stump being one centimetre long. This gave 11.88 per cent. of fever and 3.46 per cent. of infection.

As a general rule fever occurring during the healing of the navel is due to infection, notwithstanding the failure of local symptoms, and especially the coincident frequent digestive disturbances cause no fever.

The author summarizes the treatment of the umbilicus as follows:

1. Cut the cord as closely as possible.
2. The bandage once applied should not be changed except for good cause, and preferably the bath should be omitted.

PLACENTAL MOLES.

KEHLER (*Archiv für Gynäkologie*, Bd. xlv., H. 3), after giving an exhaustive series of statistics regarding mole pregnancies, arrives at the following conclusions:

Twelve per cent. of his cases had had precedent abortions. Previous general health or genital disease seemed to exercise but little influence in the production of moles. Vomiting in such cases the author does not find more common than in normal pregnancies. A feeling of debility seems to be more common and more severe in mole than in normal pregnancies. Pain in the abdomen was noted in 42.5 per cent., but there was nothing characteristic in the pain and no tenderness was noted. Œdema of the lower extremities was seen in 30 per cent. of cases. This condition seems more frequent here than in normal pregnancies, but in some of the cases nephritis was coincident.

A significant largeness of size of the uterus, not corresponding to the time of the pregnancy, was noted, and this increase in size was without evidences of foetal extremities or heart-beat. This symptom the author regards as suggestive.

Uterine hemorrhage occurred in forty-one out of fifty cases; it was irregular and intermittent, and in fourteen cases it was severe.

The author has demonstrated that the majority of mole pregnancies end in abortion between the fourth and fifth months.

It has been found in forty-five out of fifty cases that the duration of birth was twenty-four hours. In two-thirds of his cases the duration of labor was under six hours. Labor pains were weak in 22 per cent.; regular and moderately strong in the same percentage; strong in 52 per cent., and intermittent in 4 per cent. Hemorrhage was entirely absent in 12 per cent., but in somewhat over half of the cases, severe hemorrhage occurred during birth. In some this bleeding was severe enough to produce syncope. The size of the moles varied from one-half to three kilos, and their diameter from eight to thirty centimetres.

In two-thirds of the cases the expulsion of the mole can be left to uterine contractions alone. If hemorrhage be present, the antiseptic vaginal tampon-

ade should be used. The author advises induced abortion in all cases when the diagnosis is established. Regarding the puerperal period in such cases, two-thirds of all patients experience no special disturbance; the average duration of the puerperal period was fifteen days. Complete restoration to health followed in two-thirds of the cases.

Subsequent menstruation occurred normally in 51 per cent., freely in 37.7 per cent., irregularly in 6 per cent., returned but once in 2.2 per cent. In 5 per cent. there was no return of menstruation. Secondary sterility has been observed scarcely more frequently than after abortion.

The pathology of the placental mole the author regards as the following:

1. The membranous tufts have the same form as the normal embryonic tufts or chorion tufts of the first two months.

- Moles have certain important life peculiarities, as: 1. The membranous tufts consist of living, growing tissue elements. 2. They draw their nutrition immediately from the uterine walls. 3. Notwithstanding this apparently unfavorable condition, the tufts do not fall into necrosis as the chorion tufts do after withdrawal of the blood supply, but continue to live and grow.

FŒTAL DEATH CAUSED BY LACERATION OF THE UMBILICAL ARTERY.

WESTPHALEN (*Archiv für Gynäkologie*, 1894, Bd. xlv., H. 1) reports a case of tearing of the umbilical artery before the evacuation of the liquor amnii, with the consequent death of the child. The mother was a II-para, perfectly healthy, and with a normal pelvis. The child presented by the breech, and was dead when born. The umbilical cord was looped firmly around the child's neck. On examination the placenta was found to be of medium size, fairly soft, and without any kind of infiltration. Membranes intact, and between them were numerous clots. The tear in the membranes was near the placental edge. A considerable defect in the placental amnion was to be seen, a large segment of the amniotic covering being stripped off, and just beneath this the artery could be seen obliquely torn across. The child showed a syphilitic eruption on the buttocks and legs, and microscopical examination demonstrated a general degeneration, specific in character, although there was nothing in the history or appearance of the mother to indicate any infection.

PUERPERAL FEVER.

DRAGE (*Lancet*, 1894, Nos. 3678 and 3679) contributes a most interesting and valuable article on the pathology and treatment of puerperal fever. He concludes that puerperal fever depends primarily on conditions connected with the mother. Delivery, even of the most favorable kind, provides a nidus for the growth of bacteria, but deliveries after which what may be called refuse material remain behind, or during which wounds of the maternal parts are produced, or deliveries accompanied by venous thrombosis or embolism, afford specially suitable nidi for the growth of bacteria. The author points out that such bacteria have a definite position in the economy of Nature—that of the breaking up of dead animal substances. From the purely saprophytic forms, by the process of natural selection, other forms develop. Of these a number produce disease in the human body, of

which some, by exposure to fixed conditions for a length of time, have acquired fixed characteristics, both structural and functional, and these are those which cause such diseases as scarlet fever.

Other forms, like those which produce sepsis—for the reason that the conditions which are necessary in the human body for their growth are now much better known, and consequently dealt with, have not such fixed characteristics, either functional or structural. The variations, therefore, in the symptoms which they produce are much wider than those of the zymotic diseases. The various complications of sepsis are considered, and the author endeavors to show that the prevention of septic fevers is to a great extent dependent on the care taken of the woman from the advent of her labor to the close of her lying-in. Notwithstanding the efforts to save the woman from harm, accidents occur, as in surgery; but these, with our present means of treatment, can, if the cause of the disaster be discovered, be prevented in not a few cases from terminating disastrously.

GYNECOLOGY.

UNDER THE CHARGE OF

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OF NEW YORK.

THE INFLUENCE OF CÆLIOTOMY ON TUBERCULOSIS.

STCHÉGOLEFF (*Archives de Méd. expérimentale et d'Anat. path.*, September 1, 1894) draws the following conclusions from experiments on dogs: Tuberculous peritonitis in dogs can be cured by cæliotomy, provided that the operation is performed during the incipient stage of the disease; otherwise it is merely palliative. Following abdominal section the tissues around the tubercles become infiltrated with embryonic cells, which constitute a barrier to the extension of the focus and attack the bacilli; undergoing organization, they are transformed into fibrous tissue, the specific germs being eventually destroyed and absorbed. The actual curative influence of the operation is probably due to traumatism of the peritoneum, thermal action, and the effect of air and light, the combined result of these factors being a peritoneal irritation followed by a more or less intense inflammatory reaction, which arrests the morbid process. Contrary to the views of Vierordt and Riva, the complete evacuation of the fluid in tuberculous ascites is not the sole cause of the cure. In the writer's experience, the curative effects of abdominal section were equally marked in cases in which no fluid was present.

ETHER-NARCOSIS IN GYNECOLOGICAL OPERATIONS.

FRITSCH (*Centralblatt für Gynäkologie*, 1894, No. 35) affirms that the superior advantages of ether over chloroform are not sufficiently appreciated by

gynecologists. If narcosis be profound the breathing is no more disturbed with ether, while the operator is less troubled by the intestines getting in his way. There is less shock in abdominal operations than when chloroform is employed, especially in weak and anæmic subjects, whose pulse is often actually improved by ether. This is noticeable in cases of ruptured tubal pregnancy, in which many patients might have been saved in the past by using ether instead of chloroform. The writer calls attention to the fact that general surgeons have long recognized the advantages of the former anæsthetic, and thinks that it is time that gynecologists should follow their example.

GARRÉ (*Deutsche med. Wochenschrift*, 1893, No. 40) is equally emphatic in his commendation of ether, which he believes possesses decided advantages over chloroform, as regards not only safety of administration, but subsequent ill effects. He denies the existence of nephritis following the use of the former. The only contra-indication to its use is pulmonary disease. Mixed narcosis is undesirable, as well as dangerous.

TSCHMARKE (*Deutsche med. Wochenschrift*, 1894, No. 4) thinks that ether is preferable to chloroform under all circumstances except in bronchitis and other pulmonary troubles, where it is necessary to obtain complete muscular relaxation(!), and in operations about the face where the cautery is used. It is especially indicated in operations upon patients with cardiac lesions. He reports one death from respiratory paralysis in five hundred cases.

GROSSMANN (*Deutsche med. Wochenschrift*, 1894, No. 3) states that ether is used almost entirely in Landau's clinic, only one death having been noted in 23,804 cases collected by him.

CASTRATION FOR UTERINE FIBROMYOMA.

FRANK (*Correspondenzblatt für Schweizer Aerzte*, 1894, No. 7) reports twenty cases in the Berne clinic (with no deaths), in three of which it was impossible to remove the adnexa. In twelve patients the hemorrhages promptly ceased; in nine the tumor diminished in size to such an extent that it could no longer be felt, even under narcosis; in ten pain and pressure-symptoms were entirely relieved. More or less marked climacteric disturbances were noted in seven. The writer recommends that in cases in which hemorrhage is a prominent symptom thorough curettage and cauterization of the uterine cavity should be performed a few days before the operation.

TOTAL EXTIRPATION OF THE PROLAPSED UTERUS.

RECLUS (*Archives de Tocol. et de Gyn.*, 1894, No. 2) believes that hysterectomy does not effect a radical cure in cases of procidentia, since it is often necessary to operate subsequently for the cure of cystocele and rectocele. Such has been his own experience. He does not approve of the radical operation even when supplemented by colporrhaphy.

HERNIA UTERI IN A PSEUDO-HERMAPHRODITE.

BROHL (*Deutsche med. Wochenschrift*, 1894, No. 15) reports the unique case of an unmarried woman, thirty-six years of age, who had an imperforate penis

four inches and a half long when erect, the external genitals being otherwise those of a female. In the left labium majus was a painful tumor, which could not be reduced. On examination it was thought to be the uterus, at one side of which was a small body which increased in size during the menstrual period, and was consequently taken to be an ovary. The diagnosis was confirmed on incising the hernial sac. The uterus with its adnexa were amputated, the stump formed by the elongated cervix being stitched in the wound. The specimen consisted of a uterus bicornis, the left ovary being well developed, while the right was rudimentary. The Fallopian tubes were much dilated. Neither testicles, vesiculæ seminales, nor a prostate could be found. The patient made a good recovery.

MICROBES IN THE NORMAL URETHRA.

V. GAWRONSKY (*Münchener med. Wochenschrift*, 1894, No. 11) by microscopical examination of the secretions of the normal urethra in sixty-two females, found pathogenic bacteria in twenty-four per cent. of the cases. Pathogenic bacteria were observed in twelve instances, and the bacterium coli commune in two, the latter being peculiarly interesting. Reymond has called attention to the fact that the latter microorganisms may be a cause of cystitis in women who have never had instruments introduced into the bladder, and reports seven cases which confirm this opinion. Wreden has also proved this fact experimentally.

VENTRO-FIXATION WITHOUT OPENING THE ABDOMEN.

CZEMPIN (*Deutsche med. Wochenschrift*, 1894, No. 21) describes a new method of ventro-fixation which he has practised successfully in eleven cases. The uterine cavity is first curetted with the patient in the dorsal position. The uterus is then replaced manually or with a sound, adhesions being separated. A silk suture is passed through the cervix, is tied, and the ends are attached to a small ring on the anterior surface of the sound, which is thus held in position. The patient is then placed in Trendelenburg's posture and a small incision is made in the median line just above the symphysis, exposing the peritoneum. The fundus uteri being held in contact with the abdominal wall, a large curved needle carrying a silk suture is passed through the edge of the wound into the muscular substance of the uterus at a point near the right cornu, in front of the origin of the tube. It is brought out at about the middle of the fundus, is re-entered nearly at the same point and (while an assistant tilts the uterus so as to bring its left horn beneath the peritoneum at the bottom of the wound) traverses the muscular substance of the organ emerging from it behind the origin of the left tube, and thence through the edge of the external wound at a point an inch higher up than the opposite point of entrance. A similar suture is introduced forming a cross with the first at the top of the fundus. The ends of the sutures are secured with clamps, and the sound is withdrawn from the uterus, which sinks downward a little. The abdominal wound is then closed, a strip of iodoform gauze being inserted in the lower angle for a couple of days. The fixation sutures are now tied each with its fellow on the same side of the incision. The operation does not exceed half an hour, and no blood is lost. All the sutures are removed on the tenth day, and the patient is ready to be dis-

charged two days later, without a pessary or other support. The eleven cases in which this operation was done were successful, the uterus remaining anteverted and movable after the lapse of several months.

[The principle involved in this operation is essentially the same as that of Krug's "transperitoneal hysterorrhaphy," described by him several years ago.—H. C. C.]

PÆDIATRICS.

UNDER THE CHARGE OF

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ASSISTED BY

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TREATMENT OF TUBERCULOUS PERITONITIS.

MARFAN (*La Presse Médicale*, August 18, 1894, p. 261) considers the treatment, both medical and surgical, of tubercular peritonitis in children, and reports the satisfactory results of a purely medical treatment in seven cases coming under his observation in the preceding eighteen months. Under the head of medical treatment he includes:

1. *Rest*. When possible he conjoins with this a sojourn in the country or at the seashore, with suitable climatic conditions. In this connection permanent aëration, or open-air treatment, as practised in sanatoria would be a valuable adjunct.

2. *Diet*. This should be as substantial as the digestive functions permit.

3. *Drugs*. The *sirop iodo-tannique*, in the author's opinion, is one of the best anti-tubercular remedies for children. Cod-liver oil, creosote, or its derivatives, phosphates, or hypophosphites, may also be employed with advantage, while arsenic is of value, but must be kept within the limit of causing gastro-intestinal derangement.

4. *Counter-irritation*. A coating of tincture of iodine is applied to the abdominal parietes, and when dry is covered with a coating of flexible collodion. The latter in a measure immobilizes the abdominal wall and the organs beneath and diminishes by compression the hyperæmia of the affected parts. According to the effect upon the skin these applications are renewed weekly or fortnightly.

5. *Laxatives* are to be given from time to time, preferably oil; for diarrhœa, intestinal antiseptics are advised; and in case of colic, laudanum or elixir of paregoric is prescribed.

The surgical treatment embraces puncture with or without injection of medicated solutions, and laparotomy.

Simple puncture is indicated in case of an abundant ascites which shows no tendency to recede under medical treatment such as above outlined.

In encysted collections puncture is useful as a method of exploration, and sometimes, though exceptionally, curative. After evacuation Debove and Rendu have tried the injection of antiseptics—the former boric acid solution, the latter *naphtol camphré*. This method has given little encouragement. The same may be said of the injection of the blood-serum of dogs, as practised by Kirmisson and Pinard, and of the injection of sterilized air, according to the suggestion of Von Mosetig-Moorhof.

Laparotomy is applicable under the following conditions: First, fibro-caseous peritonitis with ascites; second, localized peritonitis with encysted collection; and, third, intestinal occlusion occurring in the course of a tubercular peritonitis. Even in these cases contra-indication to laparotomy should be furnished by the coexistence of other tubercular lesions in thoracic organs or the intestine, when extensive and advanced. That is to say, a pulmonary tuberculosis limited to the apex and without signs of softening, or foci of tubercular disease in bone, are not contra-indications. But softening in the lung, tracheo-bronchial adenopathy, or tuberculous enteritis should prevent surgical intervention.

Chronic albuminuria is also a contra-indication to operation, whether the renal lesion be or be not of specifically tubercular nature.

CONTAGIOUSNESS OF ANGINA À STREPTOCOQUES.

VARIOT (*Journal de Clin. Enfance*, in *Revue mensuelle des Maladies de l'Enfance*, September, 1894) reports an interesting observation on the contagiousness of pseudo-membranous angina in which the Loeffler bacillus is not present.

In a certain family a boy of three years developed a temperature of 102.2° to 104° F., with an exudate upon the tonsils, at first discrete, then involving the uvula and the pharynx, with pronounced cervical adenopathy, presenting exactly the picture of diphtheria. At the end of eight days under antiseptic treatment the danger was over, but the voice was hoarse, and remained so for some time. Several days later the sister, a child of eleven years, who had previously had diphtheria, and for three years had continued to have a swelling of the glands of the neck, was taken in turn with an extensive pseudo-membranous angina. Cultures showed the existence of angina à streptocoques. Several days later the mother, aged forty years, who had nursed the children night and day, was attacked in turn. In this case the angina was not so extensive, the exudate being confined to the tonsils, the pillars, and to a small area at the lower part of the pharynx; but for some time the false membrane was reproduced, and after suspension of treatment was reproduced anew. This membrane was found to contain only streptococci. In addition to the cases mentioned, a domestic in the house contracted a sore-throat of the same character. All the cases recovered. While the primary case in the little boy was not examined bacteriologically, the author does not doubt that it was of the same nature as the other cases were proved to be.

AN EARLY GRAVE COMPLICATION OF PHARYNGEAL DIPHTHERIA.

AUFRECHT (*Therapeutische Monatshefte*, 1894, No. 3, p. 100) calls attention to a particular form of diphtheria of the pharynx, which, despite its limited local extension, rapidly kills the patient in two or three days. It has been

held that these almost foudroyant cases were to be attributed to a grave infectious myocarditis. Recently, however, the author has observed three cases of this kind where the autopsy showed no trace of myocarditis, but a sub-acute nephritis. The author, therefore, insists upon the importance of systematic examination of the urine from the beginning of diphtheria, even when no symptom points to a renal lesion.

The symptoms observed in these cases have been very great frequency of pulse, a semi-comatose condition, delirium, high fever, and marked albuminuria. Guided by these cases the author has been able in a fourth case to combat this nephritis in the beginning by the administration of large quantities of alkaline and saline water (Wildungen) for the purpose of increasing diuresis and relieving the choked-up kidneys.

SERUM-THERAPEUTICS OF DIPHTHERIA.

ROUX, of Paris, in a communication to the Eighth International Congress of Hygiene and Demography, Budapest (*Lancet*, Sept. 22, 1894, p. 675), reports the results of the serum treatment of diphtheria in the wards of l'Hôpital des Enfants Malades, from February 1st to July 24th of the present year.

Since 1891, with the collaboration of L. Martin and A. Chaillou, the author has carried out experimentation along the lines first indicated by Behring and elaborated subsequently by this investigator, either alone or in conjunction with Ehrlich, Boer, Kossel, and Wassermann, whose observations upon the treatment of human patients have so recently been brought before the profession. (See *Deutsche medicinische Wochenschrift*, 1893, Nos. 17 and 18; 1894, No. 16. *Zeitschrift für Hygiene und Infektionskrankheiten*, vol. xvii., No. 3.)

For therapeutic purposes it is desirable to immunize large animals so that large quantities of serum may be at disposal. The author has, therefore, used the horse, which is most easily immunized and stands the toxine much better than goats, sheep, or cows, although, according to Behring, an animal supplies a serum of greater antitoxic power in proportion to its greater sensibility to the toxine. The horse, however, has furnished very efficacious serum for the author's experiments. Experiments were begun in the hospital February 1st. Visits were made every day to the wards and children treated in whatever stage they were found. No selection was made, so that the gross results during the months of treatment may be set side by side with those previously recorded. The local treatment remained the same (glycerin and salicylic acid, boric acid washes). Beside the statistics for comparison thus furnished, the results of treatment of diphtheria in l'Hôpital Trousseau, where the serum was not in use during this period, may be likewise contrasted.

The total mortality of children admitted to the diphtheria wards during the past four years gives a mean of 51.71 per cent. During the period of experimentation 448 patients were admitted and received the serum treatment, and of these 109 died, a mortality of 24.5 per cent. As compared with the previous experience under the same conditions, the difference between these percentages represents the benefit conferred by the treatment.

During the same months 520 children with diphtheria were admitted into the Trousseau Hospital. Of these, 316 died, a mortality of 60 per cent.

Again, to distinguish between angina and croup requiring tracheotomy, the mean mortality of angina for four years has been 33.94 per cent.; during the months of treatment with serum the mortality declined to 12 per cent., while in the same period at the Trousseau it was 32 per cent.

Among the croup cases submitted to tracheotomy the mean mortality for four years was 73.19 per cent. During the serum treatment it fell to 49 per cent., while at the sister institution a death-rate of 86 per cent. was recorded.

Taking now into account the presence of false diphtheria, which, according to statistics, covers one-fourth at least of the cases admitted, and which exhibits naturally a very slight mortality, the author excludes from the 448 cases 128 which were proved by bacteriological test not to be truly diphtheritic, and in addition 20 cases which succumbed before receiving serum treatment. This leaves 300 cases of true diphtheria treated by serum, with a mortality of 78, or 26 per cent. The earlier work of MM. Roux and Yersin and MM. Martin and Chaillou established the fact that in the same hospital the mortality of children attacked by diphtheria, as confirmed by bacteriological examination, was 50 per cent.

To all children admitted 20 c.c. of serum were administered at one insertion under the skin of the side of the abdomen. If the bacteriological examination showed that the patient was not diphtheritic the injection was not repeated; 128 children affected with various forms of angina were thus treated without the least inconvenience. It even appeared that the angina was relieved in a number of cases; and they remained some days exposed to contagion without being infected, a proof of the prophylactic value of the serum. In diphtheritic cases, twenty-four hours after the first injection, another of from 10 to 20 c.c. was given, and this usually sufficed to complete the cure.

The principal modifications produced by the serum upon the course of the angina are as follows: The general condition remains good or improves very quickly, provided the treatment be not commenced at too advanced a period of the infection. The pale and leaden faces are scarcely seen in the wards; the expression of the children is more lively and cheerful. Duration of the disease is curtailed, the appetite quickly recovers, and wasting is slight. The sequelæ are more rare—a few cases of paralysis of the soft palate of short duration, one case of paralysis of a lower limb, and one case of total paralysis supervening during the convalescence of a child admitted struggling on the sixth day of the disease. Three children died from syncope—one in less than twenty-four hours, and another in less than twenty-six hours after admission, and the third succumbed five days after commencing treatment.

The false membrane ceases to grow within twenty-four hours of the first injection, and detaches itself in thirty-six or forty-eight hours, at the latest by the third day. The bacillus disappears from the throat at the same time as the false membrane, most frequently cultures failing to produce colonies from the third to the fifth day. The temperature falls promptly; the deferescence is abrupt, as if the disease had been suddenly checked. The pulse returns to normal two or three days after the temperature.

As it is well known that cases in which the bacillus is associated with the streptococcus are of graver import than pure diphtheria, so in these cases the serum is less efficacious; it only produces good results when injected in strong and repeated doses. In spite of this the disease is of longer duration, and the temperature and pulse return only slowly to normal, and temperature does not fall abruptly. Broncho-pneumonia is a formidable complication, always threatening in these cases of associated diphtheritic angina. Among the 300 diphtheritic cases, 169 had angina, and 120 were affected with pure diphtheritic angina; of these latter, 9 died, or 7.5 per cent. If 7 who were in the wards less than twenty-four hours be deducted, there remain 115 cases of pure angina with 2 deaths, a mortality of 1.7 per cent. Forty-nine patients had angina with associated streptococcus; they yielded 12 deaths, a mortality of 24.2 per cent. Deducting 4 children less than twenty-four hours in the hospital, it gives 45 cases with 8 deaths, or 17.7 per cent. Under the old conditions, in the same hospital, this class of cases gave a mortality of 87 per cent.

Of cases subjected to tracheotomy 121 have been treated; 56 died, a mortality of 46 per cent., as contrasted with 68 per cent. in previous years. To separate pure croup from associated croup, the pure croups numbered 49, with 15 deaths, a mortality of 30.9 per cent. Deducting 4 cases less than twenty-four hours in the hospital, there remain 45 cases with 11 deaths, or 24.4 per cent. The cases of associated croup numbered 72, yielding 41 deaths, a mortality of 58.3 per cent. Deducting 10 cases in the ward less than twenty-four hours, there remained 62 cases with 31 deaths, or 50 per cent. The mortality previously had reached 80 per cent. Finally, it may be stated that locally all caustic or poisonous substances are proscribed. Two or three times a day is used a wash of boric acid, or, better, of water, to which are added 50 grammes of Labarraque's solution per litre.

It may be added, as a matter of interest, that among the 300 cases, 85 had concurrent diseases—33 measles, 13 scarlatina, 6 tuberculosis, 3 whooping-cough, 3 varicella, and 39 broncho-pneumonia.

FATAL PNEUMONIA IN INFANTS FROM SEPTIC INFECTION DURING BIRTH.

LEGRY and DUBRISAY (*Journal de Médecine de Paris*, June 3, 1894) report two cases in which the mothers recovered from labor, but the infants died of septic inspiration pneumonia. In the first case, a primipara, the membranes ruptured early and the liquor amnii became fetid, delivery being retarded by a rigid cervix. Tarnier's dilators and the forceps were used. The child was born asphyxiated, covered with fetid slime. Aspiration relieved the air-passages of a quantity of mucus, and respiration was established. The infant died sixty hours later with well-marked broncho-pneumonia. In the second case, also, the membranes ruptured early, and the child was not born till forty hours later. The mother had a very profuse greenish vaginal discharge. The child's respiration was embarrassed from birth, and it died after eleven hours. Pneumonia and pleurisy were shown by the autopsy. The pleural fluid and other fluids and tissues of the body contained streptococci, which were found to be present also in the vaginal discharge of the mother.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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TUBERCLE BACILLI IN THE NASAL CAVITY OF HEALTHY INDIVIDUALS.

STRAUS (*Archives de Méd. exper. et d'Anat. path.*, 1894, vi., No. 4, 633) has succeeded in demonstrating the presence of virulent tubercle bacilli in the nasal cavities of persons, who, though themselves healthy or affected only with some chronic nervous disease, had been inmates of the same wards with phthisical patients for some time previous, or were physicians in attendance upon such patients. In none was any trace of tubercular trouble discoverable. Yet in nine of twenty-nine cases examined the presence of the bacilli in the nasal mucus was proved.

The investigation was conducted as follows: The whole nasal cavity as far as possible was swabbed out with small pledgets of cotton. These were thoroughly shaken in sterilized bouillon or water, and this was then injected into the peritoneal cavity of guinea-pigs. In seven cases the animals died of septicæmia or of purulent peritonitis before it was possible to determine the presence of any tubercular process; thirteen of the animals remained well, and when killed showed no trace of tuberculosis; in nine cases the animals died or were killed at the end of from three to five weeks, and when examined showed tubercular lesions, often very pronounced, in which the presence of tubercle bacilli was demonstrated. Thus, in nearly a third of the cases examined the nasal cavity contained virulent tubercle bacilli in sufficient numbers to cause pronounced lesions in guinea-pigs.

The importance of the results of these experiments of Straus is very great. In 1875 Laveran showed by statistics that the mortality from tuberculosis among the inmates of the military infirmaries was much greater than that from the same cause in the standing army, and somewhat later Debove drew attention to the greater frequency of phthisis among those who had been long residents of the Hospital Bicêtre because of chronic nervous or other non-tubercular disease. The investigation of Cornet, in 1888, into the mode of dissemination of the tubercle bacilli outside the body afforded an explanation of this greater prevalence of tuberculosis in hospitals, almshouses, nurseries, etc., since he demonstrated the presence of the bacilli in the dust and on the walls of the wards of these institutions; and infection through inhalation of this infectious dust was inferred as the probable mode of communication of the disease. In the experiments of Straus we have direct proof of the correctness of this view, for the tubercle bacilli are found in the very act of entering the body through the respiratory tract. Still it must not be supposed that in all the cases in which the bacilli were found in the nasal cavity tuberculosis would have resulted; the great majority of the germs would undoubtedly be cast off in the nasal mucus and never find entrance to the body.

The results of Straus also afford another instance of the important functions of the nasal mucous membrane in ridding the inspired air of the micro-organisms which it may contain, for in none of the cases in which tubercle bacilli were found was there any sign of tuberculosis of the lungs, which would have been expected in at least some of them if the germs had found access to the deeper respiratory tract.

THE GONOCOCCUS: ITS CULTIVATION ON ARTIFICIAL MEDIA AND
INOCULATION IN DOGS.

FOR nearly six years after its discovery all efforts to cultivate the gonococcus artificially were unavailing, and in consequence the proof of its pathogenic nature was incomplete. In 1885, however, it was successfully cultivated upon human blood-serum, and its virulence was demonstrated through inoculation into the human urethra. Until very recently human serum has been supposed to be a necessary ingredient of all culture media for its growth, and the difficulties of obtaining this in sufficient quantity have prevented any very general use of cultures of the gonococcus for diagnostic purposes. About a year ago it was discovered that the addition of urine to the culture medium afforded the conditions necessary. It was at first supposed that this depended upon the presence in the urine of certain salts necessary for the growth of the gonococcus. This TURRÓ (*Centralbl. für Bakt. u. Parasit.*, 1894, xvi., No. 1) shows to be a mistake. What is needed for the cultivation of the gonococcus is an *acid* medium.

Although the freshly voided urine in gonorrhœa is usually alkaline in reaction, Turró points out the fact that this is due in great part to its content of pus, since, when this has settled, the supernatant liquid is acid. In this acid urine the gonococcus develops vigorously. The idea was thereby suggested that this might be due to the acidity of the urine, and culture media were prepared of various degrees of acidity to test its accuracy. It was found that the gonococcus grew well on ordinary gelatin which had not been neutralized. Even the addition of a drop of hydrochloric acid to each 100 c.c. of this medium served only to delay the growth, not to prevent it.

These facts are important, since they make it possible very easily to obtain pure cultures of the gonococcus from gonorrhœal pus. Its simple inoculation into such an acid medium is sufficient, since the strong acidity of the medium prevents the growth of any other germs which may be present.

For details of the appearance of the cultures under various conditions we must refer to the original paper.

Another important fact developed by Turró is that the gonococcus thus grown on acid media possesses pathogenic qualities for dogs. A little of the culture introduced under the prepuce, without necessary injury of the mucous membrane or introduction into the mouth of the urethra, produces intense purulent inflammation, which may extend up the urethra to the bladder and kidneys, or may result in a general systemic infection and pyæmia. The gonococci obtained by subsequent culture from these lesions are somewhat smaller than those of man, but are otherwise similar. The infection is less severe in bitches. It was found that gonococci thus virulent

when grown on acid media lost their virulence when transferred to alkaline or neutral media. On acid media their virulence was retained for more than a month.

SUDDEN DEATH DUE TO THE HEART,

THIS is the title of an interesting article by COUNCILMAN, read before the Massachusetts Medico-Legal Society, and published in vol. ii., No. 4, of their *Transactions*.

Of endocardial conditions which may lead to sudden stoppage of the heart, thrombosis and embolism are considered the most important, though of rare occurrence. By far the most frequent causes of sudden death are to be found in disease of the heart wall, and by far the most important of these result from lesion of the coronary arteries and consequent diminution of blood supply to the heart muscle. Since the coronary arteries are "terminal arteries," as a rule having no considerable anastomoses with one another, disease of one of them may seriously impair the blood supply of that portion of the heart wall dependent upon it for nourishment. If sudden stoppage of one of the larger branches occur, infarction of the heart muscle may result. This is, however, rare, and the usual effect of interference with the coronary circulation is the growth of fibrous tissue in that portion of the wall insufficiently nourished—interstitial myocarditis. The patches of fibrous tissue thus formed are prone to stretch and become thin, in which case a true aneurism of the heart results, and, like aneurisms of the vessels, this may rupture. Other causes of rupture of the heart dependent upon disease of the coronary arteries are the formation of patches of necrosis or of fatty degeneration. Fatty infiltration, in which large deposits of fatty tissue beneath the pericardium and in the myocardium occur, is also an occasional cause of rupture of the heart.

In rare cases sudden death may result from pericarditis, where the very rapid accumulation of exudate may overwhelm an already enfeebled heart. The sudden death occasionally observed in cases of aortic stenosis is probably dependent in most cases on the inability of the already overtaxed heart-muscle to cope with a sudden increase of intra-cardial pressure brought about by exertion or by psychic influence.

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A CONTRIBUTION TO THE TREATMENT OF ORGANIC
DISEASE OF THE HEART.

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ONE always writes about a subject which has been considered frequently with some hesitancy. No doubt this depends upon several facts: First, we feel we have nothing, it may be, very new to add to our common stock of knowledge; or, we are persuaded that no matter how carefully we may study and observe what we see daily, similar work has been done by men of acute mind and long training in our profession, and that they have left very little to be said by those who come later in the day. Moreover, we know that the work we are familiar with is often of the best kind, and we are fearful lest our little offering be regarded as insignificant in character and in bearing. Still, it is given to every earnest worker to note things which have some new aspects, and which may be estimated in an individual manner, which is at times both interesting and instructive to his readers.

One of the facts which is most prominent in my estimate of organic affections of the heart is that which shows the little need, at times, of treating heart disease merely because a murmur is present. How often does this exist without symptoms! How frequently an accidental examination reveals it! Why, then, treat it? We must, first of all, consider the patient. If accompanying the murmur there be rational symptoms of cardiac incompetency, such as pain, dyspnoea, palpitations, and if to these be added hypertrophy or dilatation, there can be no question that properly instituted medication may be of great service and relieve all

distress for awhile. In administering drugs we must recognize, however, that we give them for the purpose of relieving symptoms or diminishing the complicating conditions, not to cure chronic valvular disease; once the latter is well established it is there to remain, and our effort should be not to cure, but to prevent it from becoming really injurious by reason of its possible effects.

Perfect compensation in chronic disease is what we wish, and seek to attain when it is broken. When it is present no treatment is required.

One great cause, as we know, of most valvular affections is rheumatism. Sometimes, with all the care we can exercise in the management of this affection, cardiac disease will accompany its acute course, or follow sooner or later as a lamentable sequela. And yet it frequently seems to us, if the disease were managed with more care and intelligence, as though there might be fewer instances of heart disease. Different treatments of acute rheumatism have been thought to lessen the liability to intercurrent or later cardiac complications. My own tendency has always been to give an alkaline treatment, sometimes by means of bicarbonate of soda and Rochelle salts in moderate, frequently-repeated doses, sometimes with acetate of potash and chloride of ammonium. Either of these combinations appear to me preferable to the use of the salicylates in neutralizing the bad effects of acute rheumatism. I have occasionally been of the opinion that the duration of the disease in its acute form was thus lessened. I am confident that the pain of the disease is frequently diminished in a marked degree. In a few cases, where the temperature is high, the pulse bounding, I have used additions of small doses of aconite to the second mixture for a few days, with apparently very good effects. Of course it is important each day during the active stage of the disease to watch closely the condition of the heart; sometimes endocarditis will betray itself easily by a marked increase of local pain, dyspnœa, fever, general prostration. Not seldom it is only by the closest attention that we can discover the beginning of the valvular inflammation. It is very important, however, to recognize it when it is present, for by its careful management at the period of its inception, we can ward off the chronic and incurable consequences which may follow under other circumstances.

Rest in bed in acute endocarditis is all important, so as to reduce as far as possible cardiac activity. And not only is this confinement to bed essential during the febrile acute stage of endocarditis, but it should be kept up for many days after this is over, and when the rheumatic pains are no longer very pronounced. Even after the patient sits up, particular attention should be paid him, and so soon as he shows signs of fatigue he must immediately return to bed.

Nothing gives cardiac dilatation more readily than too great strain or fatigue after acute disease, especially when the type of it is at all severe

or it has lasted any length of time. In this respect, however, individuals differ greatly, and what in one case would seem even beneficial to the patient, and allows his cure to go speedily onward, in another will appear to retard convalescence evidently, and instead of being of service is, on the contrary, a positive injury. The ability to discriminate between the different powers of resistance of various individuals, in other words, to lay down an exact measure of their vital force, is one of the difficult and arduous problems of medicine. We can never precisely gauge it in any two cases, no matter how much alike they seem to be, and the result is that we frequently deceive ourselves and are led into woful error, even when we wish most to avoid it.

No doubt hereditary tendency shows itself in some of these examples of cardiac weakness following acute disease, and if we go into family history closely we may obtain facts which will be of real service, by enabling us to forewarn our patients and thus ward off from them the results of real imprudence and consequent heart-strain. Later on, after a patient has left his bed, strict rules for the government of habits and dietary are valuable, and when strictly followed are productive of good results.

The occupation is one of the subjects to which close attention should be given. If it be very laborious physically or mentally, heart dilatation may readily occur, and ere long the patient will give many signs of lowered vitality and cardiac weakness. Thus it becomes a duty on the part of the professional adviser, especially when the patient is youthful, to inquire into what is to be his future line of work, and if it be discovered to be injurious, to strike a warning note, which, though unheeded at the time, will, nevertheless, be thoughtfully regarded when the patient shows signs of waning strength or lack of recuperative power. Unfortunately, there are many people who only listen to the physician when actual physical trouble is upon them, and then it is often too late wholly to remedy all the disastrous consequences brought on by inattention, folly, or ignorance. Even when the valvular disease is clearly present, it is harmful to treat it unless cardiac compensation be broken.

The regular routine of one's daily life alone should be carefully watched and attended to in accord with the rules of a proper hygiene for obtaining the best heart-power for the individual. These rules pertain to the regulation of diet, exercise, clothing, mental occupation, bathing, and the use of stimulants.

In order to carry out our wishes in regard to all these matters—as it is not something that can be taken up for a while and then abandoned—it is often wise to inform our patient as to the precise nature of his trouble, so as to make him readier to follow exactly the regimen that we shall mark out for him, and thus attain the nearest approach to a con-

dition of continuous cardiac compensation. It is, however, often hazardous to tell a patient that he has heart disease. If he is very impressionable he becomes thoughtful about himself, nervous, excitable, and highly apprehensive. Once such patients have acquired the idea they have heart disease they continue to be unhappy and melancholic despite our best efforts to relieve their minds and quiet their fears. And yet in many cases we can truthfully affirm that if a certain line of conduct be pursued, health and well-being will almost surely follow. There need be no reasonable basis for the fear that physical disability will surely follow, or that death sooner or later, before their life's work is half accomplished, is certain to come.

Exercise in moderation in chronic heart disease is ordinarily useful; so long as it does not cause dyspnoea or palpitations it may be indulged in with advantage to the patient. While this is true, it is important to emphasize the fact that all undue strain should be carefully avoided, as harm will rapidly result whenever the heart is in this manner unduly taxed. According to Oertel, no system is more valuable at times in producing curative effects than that which he lauds specially. This method consists essentially in making the patient take daily walks up declivities of different steepness. The exercise is thus graduated according to the requirements of the patient. There is little doubt that when this plan is persistently followed for a certain length of time favorable results are frequently shown. On the other hand, some patients do not appear to be benefited at all by these graduated exercises. The amount of exercise which can be profitably taken by different patients similarly affected as regards their heart lesion varies greatly. One patient, for example, can lead a very laborious life and yet be unconscious of the fact that he has a chronic cardiac ailment until he is almost at the point of death; another with an affection of a like kind will feel very much even a moderate amount of exertion, and will soon suffer if persisted in, with notable dyspnoea and other symptoms showing cardiac distress.

In cases of children, it is sometimes difficult to determine to what extent their play and exercise should be controlled. Of course, if we allow them to join in all outdoor sports, especially in those where a contest of strength or endurance is likely to occur, great risk is taken of irremediable injury being done to an organ already diseased. If, on the other hand, we draw the lines too closely and keep continually watching and directing a boy or girl with respect to their ordinary games, we are liable to irritate and annoy them unnecessarily, and in the end do them more harm than good by awakening ever-present nervous agitation or else complete indifference. Children cannot, as a rule, be made to look at things in a cool dispassionate way, at least for continuous periods, and must be managed somewhat differently, for this reason, from adults. The true course, in my judgment, is simply to for-

bid absolutely certain sports, such as foot-ball, rowing races, tennis contests, etc., and to permit walking, riding, driving, fishing, etc., which do not specially strain the heart or call upon the energies to an excessive degree.

As regards the dietary, of course individual idiosyncrasy is to be considered, and mainly because I have found so many differences in individuals as to what kind of food suited them best; and yet we must in general, insist upon what is wholesome; viz., roast and broiled meats, no rich sauces, condiments, or made dishes. The ordinary fresh vegetables may be allowed, avoiding as far as possible those that are canned. Potatoes are often injurious, as they produce flatus and are difficult of digestion. Alcohol is bad in anything but a limited amount. It may be given in moderation at meal-time to stimulate appetite or promote digestion; more than this will probably occasion some gastric catarrh, which is decidedly prejudicial by injuring the powers of assimilation. Tobacco should be avoided, as a rule, as it is so apt to render the heart irritable and produce palpitation and cardiac distress. Very rarely in my experience has it been evidently useful; when it is advantageous it seems to be in individuals of somewhat plethoric habit and highly nervous organization, where it quiets and soothes nervous erythsm. Even then, the tobacco should be of the mildest quality, and smoking should only be indulged once a day and after meals, particularly dinner. At other times, tobacco may be said to be almost invariably injurious. Tea and coffee are also to be taken in small quantities and not too often; either of these may be allowed at breakfast according to the taste and habit of the individual. After-dinner coffee or tea should not be taken, as they often disturb a night's rest, and thus bring on a condition of bodily discomfort which is in no wise compensated for by the temporary exhilaration which is felt after their use.

I object, as a rule, to cold baths for those who suffer from heart disease, as I find they are apt to cause functional disturbance; still there is positive good sometimes in having slight cutaneous reaction after the bath, which can only follow where there has been a slight shock at first. This shock ought not to be marked, but only enough to make the patient feel brighter and more elastic after the bath than previous to it. Whenever even this small amount of cutaneous stimulation is followed later by uneasy precordial cool sensations, baths should be intermitted, and only tepid or warm baths taken every morning. Sometimes it is preferable to order the bath to be taken at bedtime, as it promotes sleep and quiets restlessness. In regard to the preferable time of day, we must learn which is best by trials, as I have found that individual preferences must be considered. It is sometimes more judicious to allow a bath only every other day, as the daily bath seems to weaken the patient, and he is notably less active when it is too frequently taken. For this

reason I am inclined to recommend sponge-baths, rather than full tub-baths, as the former excite somewhat nervous force, whilst the tub-baths are relaxing and seem in some cases, at least, to lessen vitality. Hot-water baths, hot-vapor baths, or Turkish baths, are all to be studiously avoided. The risk from them is very great, especially in regard to cerebral hemorrhage. There are times, of course, when it is essential to promote diaphoresis in this manner. When this is the case and a hot-air bath is given, the head should remain outside the hot air, so that respiration may be freely carried on. Cold applications should also be made frequently or constantly to the head during the time of the bath, so as to lessen any tendency there may be to cerebral congestion.

In general terms, clothing must be suited to climatic conditions, and woollen or merino undergarments should be worn. This instruction to wear flannel next to the skin is very important in cardiac disease, as such patients are peculiarly sensitive to changes of temperature, and their bodily heat is often at a low figure. Moreover, the slightest chill may cause a bronchial attack, which, if at all severe, may become very threatening even to life. It is preferable to have the underwear light in weight, as well as warm, otherwise the patient is often oppressed and rendered uncomfortable. I have known such patients from wearing too heavy flannels to be at times in a profuse perspiration, which of itself is weakening and renders them liable to contract numerous acute diseases which may at any moment become complications of a grave nature. Some authors advise against heavy overcoats, which oppress by their weight. My judgment is that with our mode of living and changeable, uncertain climate, the only wise plan for patients with cardiac disease to follow is to have outer garments of different weight and texture, which they can change easily and according to temperature, dampness, and direction from which the wind blows. One thing must be constantly kept before one's mind, viz., that these patients often radiate a small amount of heat relatively, and this deficit must be supplied by extra covering. Their circulation is deficient, and this is shown by the lowered bodily temperature, particularly of the extremities, which are often cyanosed, cold, and clammy. The patients in cold weather and at night will suffer very much from cold. No matter how many bed-clothes we may cover them with, they complain for quite a length of time of inability to get warm. I know of no means, indeed, of restoring bodily heat as effectually as to put hot bottles to their feet or to either side of the trunk.

These patients should lead placid, quiet lives, free from mental worry and anxieties. All emotional excitements are bad. Not only will sudden or prolonged mental strain greatly exaggerate the previous cardiac condition and render the prognosis graver; it will of itself at times occasion evident heart disease. Such instances are numerous and accurately

recorded. In time of war, particularly, they have been carefully noted and studied. In our own country during and subsequent to the war of the rebellion numerous cases of heart disease were described. It is an undoubted fact that the mental disquietude which existed, particularly among raw recruits, was an efficient cause of heart disease. Da Costa has placed on record these cases with great precision of detail and with broad appreciation of the causation and treatment.

Most authors of works or articles on organic heart disease refer also to similar instances which occurred during the terrible days of the French Revolution at the time of the reign of terror in Paris and the provinces.

Constipation must be attended to; and even though the bowels move regularly, an occasional purgative dose will help relieve the first appearance of nervous congestion of the different internal organs in an effective manner. The sort of purgative dose to be used is often an indifferent matter. A little Hunyadi or Friedrichshall water once or twice a week in the morning is frequently the simplest and easiest way of meeting the indication. With those who have a marked bilious tendency, a dose of calomel and soda, followed in a few hours by a draught with Rochelle salts, seems to give the patient new life after a few copious alvine discharges have carried out of the system a mass of effete and waste material which was a mere source of obstruction to the satisfactory working of the different organs of the body.

Whenever the patient is pale, or his appetite is poor, it is indicated to give small doses of the simple bitters before meals, combined or not with a mineral acid. If the patient be a young person, one of the iron preparations is often useful. Of these, the choice may be considerable: The tincture of iron agrees with many remarkably well, and except for its disastrous effects upon the teeth should be usually ordered when an iron preparation is indicated. As it is, I avoid giving it unless there is some very special indication for its use, and much prefer either dialyzed iron when the stomach is peculiarly sensitive, or pills of the protochloride of iron under other circumstances.

Prior to the use of the iron salts, it is essential to get the stomach and digestive tract in proper shape. If there be any evidence of catarrhal inflammation of the gastro-intestinal tract, a recurrence for a few days to some agreeable saline mixture in the morning will enable us to get obvious and useful effects from the preparations of iron.

It is thought by some writers that iron should not be given, ordinarily, to people of middle life or advanced in years, even when their blood is poor in quality and diminished in volume. Arsenic is at times a suitable remedy, and will frequently be of great benefit in helping impaired nutrition. It may be given as arsenious acid in tablet form, or in solution, as we have it in Pearson's or Fowler's preparations. Moderate

doses only should be given daily, and after a few weeks this medicine should be interrupted, either to resume it later, or else to try some other medicine with a view to giving tone to the patient who shows indications of impaired vigor.

Many occurrences, doubtless, of one's ordinary life, help disturb cardiac compensation when it exists, and it is difficult with the wear and tear of pressing occupation or interests, which can neither be ignored nor gotten rid of by many persons thus affected, to follow out the strict medical indications in each and every case that is brought to our attention. Yet when we insist emphatically how important it is in order to retain a fair degree of bodily comfort to banish, as far as may be from our ordinary avocations, mental worry and bodily strain, we have done much toward carrying home the importance of these pernicious influences when they are allowed to exert themselves. It is also true that pure air, good food, gentle exercise, hygienic surroundings in what pertains to plumbing, drainage, and ventilation, are all important adjuncts to continuous well being of very many persons similarly affected.

The compensation in organic heart disease is sometimes broken suddenly, and in that case alarming symptoms may instantly arise. These instances are not infrequent after great exertions in lifting heavy weights, or after severe contests in athletics, where the muscular and nervous system has been put on a severe strain for several hours, or even days' duration. After such accidental occurrences we are often called to witness and care for the evidences of acute dilatation of the heart, grafted on previous existing disease. In many instances the effort or strain, whether it be interrupted or continuous, may seem insufficient almost to account for the distressing sequelæ which follow. Yet when we bear in mind the fact of the pre-existing state, we have less reason to be surprised than we otherwise would. Under like circumstances, or even when the patient was doing nothing unusual but merely taking his ordinary exercise, plugging of the coronary artery has occurred and brought on a rapidly fatal termination.

The lack of compensatory power in the heart may not be of necessity rapid in its occurrence. Very frequently it comes on little by little, and in such a manner that its precise initial period is doubtful. The first symptoms of moment may be cardiac palpitations, more or less distressing in character, and lasting at first but a short time, which manifests itself even after slight exertion. These patients often get along very comfortably when they walk on level ground, but let them try to go up a flight of stairs, or a steep declivity of any kind, and immediately they suffer extremely from irregular and throbbing heart pulsations. Over fatigue, a high wind, late hours, emotional strain will cause similar unpleasant cardiac fluttering with choking sensations in the throat and chest, and a thirst for air, which is so distressing at times. One of the

most unpleasant forms of this cardiac incompetency is that in which nocturnal dyspnoea is the acute evidence of it. The patient goes to bed comfortably and falls asleep. For several hours he is obviously at ease, and his slumber is restful, when suddenly he awakens with a start, in great mental agitation, and his heart beats are rapid, irregular, and lacking in force. An alcoholic and ethereal stimulant internally with warmth to the chest by means of a hot-water bag or poultice will in a brief period relieve the situation immensely and restore the patient to relative ease and comfort. Of course, one must be on guard in any condition which seems at first to show cardiac incompetency; not to be deceived as to the cause of it.

An acute attack of stomachal dyspepsia after a late supper, flatus with distention of the colon from persistent irregularities of dietary, may cause a flatulent distention of these organs which may interfere very much with the proper action of the heart through pressure or displacement thus occasioned, and very great and immediate relief may be afforded with aromatic stimulants.

In affections of the mitral orifice mere irregularity of the pulse is so frequent a sign of this lesion that little importance should be attributed to its presence, unless it be allied with other rational symptoms, such as dyspnoea, or precordial pain—of cardiac insufficiency.

If there be a constipated condition of the bowels, a dose of licorice powder at bedtime, or a saline purge with some carminative added, in the morning on rising, may be all that is needed to re-establish perfect comfort. If the symptoms of cardiac inadequacy continue despite the rational treatment just indicated, and without further trials of other medication, absolute rest in bed must be enjoined. In a very short time, from this enforced quiet alone, great benefit results very often. The compensatory power of the heart is rapidly re-established, and cardiac irregularity may soon completely disappear. Even in those cases where percussion shows pronounced dilatation with enlargement of all the cardiac cavities, and there are evidences of cellular infiltration in the lower limbs, the advantages of rest are unmistakable. The rest in bed is of service mainly because the heart has much less work to do when a patient is in repose than when he is moving about actively. Many thousand cardiac beats are thus prevented each day, and the cardiac ganglia have an opportunity to regain their former power. Thus, the heart muscle is restored from its fatigued or exhausted condition and proper rhythmic explosions are developed.

Just as rest is important, so is more sleep to be induced, and in this way a passing condition of incompetency is prevented from becoming permanent. Of course, if any complicating condition exists which evidently interferes with the patient's rapid recuperation, this should be properly attended to. Amongst these we would mention mal-assimila-

tion of food, leucorrhœa, diarrhœa, bleeding-piles. The mere fact of arresting a weakening discharge by administering proper medicinal remedies, in connection with an appropriate dietary, may be of great service in promoting the cure, or great relief of the case, so far as all functional disturbance is concerned. Such remarkable effects are so frequently obtained by attention to the foregoing indications that patients are apt to become reckless and the physician careless. The result is that frequently the patients go back too soon to the mode of life which has been the direct occasion of their bad symptoms, and very soon we have a return of the latter in an aggravated form.

Whenever the case is that of a workingman or woman, they should be particularly warned against the evil effects of sudden strains on the heart, and should be told to seek, if necessary, occupations in which the hours of work may, perhaps, be longer, but the danger of frequent or occasional occurrence of great efforts will be wholly avoided. If the patient be a professional man accustomed to great mental toil, he should be brought to consider the necessity of an out-door life, longer hours of sleep, and soothing mental distractions as far as is practicable. If the patient be a lady addicted to the pleasures of fashionable entertainments, where late suppers, dancing, and the great stress of this mode of life in lessening nerve force be the custom, she must be told emphatically that it is only by abandoning these pleasures that she can be restored to health, and that the heart can recover healthy action in proportion as the structural failure may be lessened or cured—*i. e.*, cardiac dilatation.

In many cases, however, progress of organic disease, although prevented for a longer or shorter period, is steadily worse. Onward and downward is the march of events. Under these circumstances we are obliged to depend upon drugs or other medication systematically used from time to time, or continuously, to obtain an arrest of the troublous effects of disease.

The remedies employed are, first, those which stimulate the heart-action; and second, those which are directly tonic or corroborant in their effects, not only to the heart, but also to the blood and general system as well. Digitalis easily ranks first amongst the former in the estimation of the great number of clinicians, and must be given without regard to the nature of the lesion whenever the heart begins to fail and is unrelieved by the means previously referred to. Digitalis unquestionably, in the great majority of cases, leads other remedies by the certainty of its power and action. Whenever digitalis in small or moderate doses remains without apparent good effect, and the patient is evidently anæmic and has not yet reached middle life, some iron salt may be combined with it. There are some instances in which the iron and digitalis once begun, in order to restore the compensatory balance in the heart muscle, have to be continued long periods of time and almost continuously.

In other instances the treatment by digitalis alone or digitalis and iron combined, are only required occasionally and for a few weeks on any occasion to bring back the circulation to healthy activity. The effect of digitalis in small doses persistently and constantly given for a while is to diminish markedly cardiac dilatation, whether there be or not insufficiency at the mitral orifice. Sometimes, as an aid to the digitalis, strychnine may be advantageously combined with it. Strychnine, besides stimulating the heart, is also a stimulant to the respiratory centres, and this action is often valuable in view of the relations between the circulation and respiration, independently of what is simply mechanical.

It is sometimes wise if there be a chronic lung affection, as cirrhosis or emphysema, at the same time that there is notable cardiac asthenia, to add carbonate of ammonia to the previous combination of strychnine and digitalis. Instances are not rare in which some combination of two or more of these drugs has been taken for years, and when at any time they were interrupted almost immediately the patient began again to suffer from palpitations or cardiac distress.

No doubt in many of these cases where regurgitation at the mitral orifice results mainly from mere weakness of the cardiac muscle, and very little from the valvular changes, which are very slight, the dependence of the heart upon stimulation from these drugs is very great. Evidently, as has been shown, the mechanism for closing the mitral orifice does not reside in the valve alone, but much power is present in the muscular walls of the left ventricle, not only to lift the valve itself, but also to diminish the mitral orifice.

As a rule, however, digitalis should be intermitted from time to time, in order to obtain its best effects. Once, indeed, its bad effects produced, such as nausea and vomiting, it is frequently with some difficulty that we again obtain tolerance for the use of the drug.

One of the observations of Withering, who wrote about the use of digitalis at the end of the last century, was that it acted particularly well with dropsical patients, and when the pulse was low, feeble, irregular, or intermittent; on the contrary, when there was a tense pulse with evident thickening of the arterial coats, its action was not so beneficial or its diuretic action at all pronounced. This view of Withering is practically somewhat our own estimate of digitalis to-day. It is generally admitted that it increases and lends force to the systole of the heart; at the same time, digitalis unquestionably contracts the arterioles, and it is in this manner that arterial tension is increased. This double effect is, as a rule, very useful in mitral regurgitation, particularly at the commencement of this disease and when both effects of digitalis are desirable. Later on, the action of digitalis on the arterioles is not so satisfactory, especially when dropsy has set in, because this effect militates against its diuretic action, which is so essential at this period of the

disease. In order to obviate as far as possible this untoward action of digitalis, we should exhibit concomitantly with it moderate doses of nitroglycerin.

By the use of these drugs combined with one another we can frequently accomplish effects at the terminal stage of a mitral lesion which we can obtain in no other manner. The action of the nitroglycerin is doubly useful under these circumstances. It adds to the power of the heart's contractions; it dilates peripheral vessels, and thus renders these contractions more effective, and thus the diuretic action of the digitalis is notably increased. The amount of either one of these drugs which may be given advantageously in the condition of obstinate or increasing dropsy cannot easily be determined in advance. My plan is to give, say one drachm of the infusion of digitalis and $\frac{1}{200}$ gr. of nitroglycerin every two hours, and progressively increase both of them, if need be, up to two or three drachms of the infusion of digitalis every two hours, and $\frac{1}{30}$ gr., or even more, of the nitroglycerin at similar intervals, before we can obtain the most desirable effects. Everything depends upon the case and the effects of the drugs. If digitalis apparently causes nausea or vomiting, if the pulse under its influence, instead of becoming stronger and more regular, becomes weaker, intermittent, and very slow, it is time to diminish, or it may be, interrupt its use for several hours or days. These indications are even more formal whenever the quantity of urine remains the same and its density is unaltered. As regards the nitroglycerin, if the head throbs and pains in a notable manner, whilst the pulse remains small, feeble, and uncertain, to increase its dose would be of questionable utility.

It is most important in the use of these drugs to know that their quality and preparation can be relied on. The tablets of nitroglycerin as purchased in many drug stores are frequently unreliable, and we can at times use very large doses of the drug in this form without obtaining the effects we should expect from it ordinarily. It is preferable, therefore, to make use of a freshly prepared solution, graduated so as to exhibit in every teaspoonful a given amount of the active ingredient. The best preparation of digitalis cannot always be stated. Personally, I favor the fresh infusion of the leaves in cases where I desire particularly to procure its diuretic action. In cases where the tonic effect on the heart is most important, I prefer the tincture. Moreover, the tincture is such an available preparation, which we can always obtain and keep ready for immediate use, that this very convenience makes us, perhaps, somewhat over-rate its value. The fluid extract is, of course, given in smaller bulk on account of its greater strength. Further than this I do not believe it has any appreciable different value from the tincture, as I do not think the addition of alcohol in the tincture makes any essential change in its action unless the doses given be unusually large.

I am confident that the action of hydragogue purgatives is very important to relieve dropsy, and particularly in those cases where digitalis in moderate doses and by itself has not notably increased the bulk of urine. Compound jalap powder, with or without calomel, has always seemed to me the most reliable among the purgatives, and I give it invariably almost the preference over other means in this line when treatment is begun.

Elaeterium and croton oil never appear to me desirable if they can be properly avoided, or if the compound jalap or scammony powders prove active and beneficial. After repeated movements from the bowels, which follow the use of these purgatives, the diuretic action of the digitalis and nitroglycerin are shown frequently in a remarkable manner, and the bulk of urine is increased from a few ounces to several pints in a few days.

I have no doubt that it is important in these instances not to attempt giving any solid food by the mouth, for the patient will be quite unable to digest it, and the only consequence of allowing it to be taken is to bring on nausea or vomiting, besides causing stomachal distress, and, it may be, further injuring the condition of the patient by the toxins which are produced and absorbed. The diet should be a strictly fluid one, and even the quantity of the fluid must be limited. It would not do to allow a patient where dropsy is very considerable to take large draughts of milk or water. The milk should be limited to two or three ounces every two hours, and given preferably peptonized.

Unless the patient be unusually prostrated he should not be awakened if he is asleep to give him his dose of milk. Of course, this severity in regard to the quantity of fluids allowed should only last while the drop-sical condition is very threatening. As soon as the vessels are able to take up the effused serum in the tissues and cavities, owing to the drugs employed and the dietary just insisted upon, the latter may be increased or made somewhat more liberal.

It is especially important whenever the serous cavity contains fluid, either of the chest or the abdomen, to let it out by paracentesis, or otherwise the patient's chances of even temporary recovery are greatly diminished. It is sometimes these repeated tapplings which keep such patients alive for long periods and enable them to get about once more, when without them they would surely die, and that too, very rapidly. I can recall instances where withdrawal of chest-fluid on repeated occasions had helped restore the patient, with the other agents and care insisted upon, to a state of relative strength and comfort which has lasted a considerable period. The same statement is true in regard to abdominal puncture with withdrawal of intra-peritoneal effusion.

Of course, if there be dropsy in connection with aortic disease the same treatment holds good; but it is a well known fact that this com-

plication is then infrequent, and it is far more probable to encounter it with advanced mitral lesions.

Whenever the tricuspid valves have lost their ability to close the right auriculo-ventricular orifice, and the cavity of the ventricle is distended, while the muscular walls have lost compensatory power, we have to do with those very bad cases in which the prognosis is gravest. With pulsating, enormously distended, over-charged jugulars, with markedly pronounced epigastric pulsations, and the soft blowing murmur distinctly marked over the right heart, in addition to numerous other signs incident to this state, we have one other means besides the foregoing which will help us sometimes relieve our patient, at least temporarily. This final expedient is blood-letting. The vein at the bend of the elbow must be opened and the blood allowed to escape. A few ounces thus taken will sometimes give notable relief and enable the right heart to continue its beats, when without this help it would soon cease to combat the increasing pressure from within from the quantity of its contained blood.

It will not answer in an advanced state of incompetency, where distress and lack of power are marked with such intense features, to do more than afford some relief in this way. If we attempt it we are apt to weaken the patient too much, and the heart soon ceases to contract altogether, and stops in diastole. Of course, in those cases where there is acute dilatation of the right cavities in a heart as yet undegenerated, and which is but the result of over-strain, the quantity of blood which can be advantageously taken by venesection is sometimes very considerable, and even as much as a pint or more will be a loss soon completely replaced. Moreover, the patient's condition seems lighter and better in every way from getting rid of an excess of blood, which was the greatest obstacle which stood in the way of possible recovery from an imminently threatening condition.

This indication for relief of the right heart by venesection in acute dilatation is not changed by the fact that there may be old bronchial inflammation with emphysema; on the contrary, in just such cases this means may be our most potent one of saving life, and all other means without it appear at times to be insufficient or unavailing.

Although the usefulness of digitalis has not been doubted in later years, at least, as to its power to combat, when properly managed and helped in its action by the other means which I have mentioned, the dropsical condition dependent on organic heart disease, such is not the invariable opinion held about the value of this drug in aortic lesions where dropsy is present. Theoretically it has been considered injurious, because the diastole of the heart was lengthened, and thus the distention of the left ventricle was said to be increased. Practically, however, this judgment cannot be regarded simply because after the continuous use of digitalis for some time, even in this condition, we shall note in-

crease in the vigor of cardiac contractions. Moreover, the pulse becomes stronger and more regular, the dropsy decreases, and the bulk of the urine notably augments. It is wise, however, with an aortic lesion present, never to give large doses of digitalis in the beginning, and to increase even a very moderate dose of the drug with great care and circumspection. Upon any indication of its failing to be beneficial it is only prudent to withdraw the use of the drug and substitute some other cardiac stimulant in its place.

Whenever the oedema of the lower limbs continues, with other evidences of dropsical effusion, and is not influenced by all previous remedies, we are compelled to resort to the use of Southey's tubes or to repeated scarifications, with proper antiseptic precautions to relieve their great distention. Without such means of relief, painful ulcers may occur, which it is almost impossible to heal, and they render the patient's condition even more deplorable.

A red blush over the thickened and tense skin, not unlike an erysipelatous inflammation, may occur and give additional anxiety in our patient's behalf. After scarification or punctures, and when the fluid has pretty well drained from the lower limbs, they should be wrapped in cotton-flannel bandages, which are frequently renewed, so as to keep down the recurrence of the great swelling and distention. These means are but temporary expedients and fail to afford more than passing relief.

According to some writers, *caffein* is very little to be relied upon in the treatment of any form of organic heart disease. This opinion, fortunately, is not general, and certainly does not correspond with my own experience. In doses of one to three grains by the mouth, especially in the form of the citrate, by reason of its solubility, I regard it as being a very excellent heart stimulant. In my judgment, as in that of others, it is especially adapted to certain cases of mitral stenosis in which dyspnoea is excessive and where digitalis does not seem to act well. It is also very desirable to make use of citrate of *caffein* in combination with strychnine in cases of aortic incompetence which do not respond favorably to the action of digitalis. *Caffein* not only agrees with the stomach very well when digitalis disturbs it given in any form, but it likewise has a very marked diuretic action, particularly if the kidneys are not much diseased, which may be shown, although digitalis has remained inactive in this regard.

Some writers have regarded the citrate of *caffein* as inert when given as a salt already prepared, but in this opinion I am inclined to believe they are greatly mistaken. Even in the last stages of chronic heart disease, this drug when given in one grain doses hourly has been of great service after digitalis has failed to produce the slightest favorable impression upon the patient, and, indeed, has been followed by many evidences of intoxication from retention of the drug in the economy.

Whenever the powers of assimilation are very imperfect, the salicylate, or benzoate of caffein should be employed hypodermatically by reason of their perfect solubility and their non-irritant local effects.

The two objections to the employment of caffein continuously in large or frequently repeated doses, are first, its action in causing insomnia, which, of course, is a great drawback when a patient's nervous system seems to call imperatively for the influence of this great restorer of bodily comfort. Again, I have known patients to become restless and mentally agitated to a high degree when I have persistently used caffein for several days continuously with but short intervals of rest between doses. Hallucinations and delirium have occurred when a nearly poisonous dose has been taken by mistake rather than premeditation. The objectionable fact of these occurrences has been insisted upon by some writers.

There is another remedy for failing heart about whose value there seems to be just as much difference of opinion as there is in regard to caffein, and that is *convallaria majalis*. The Russians and some distinguished observers in France and England consider it to be eminently valuable. It has been said to produce evident regularity of the pulse and increased force of heart-beats, with great diuretic power in cases even where there was marked tricuspid regurgitation. And this action may be noted after *digitalis* fails. Like caffein, *convallaria* does not impair stomachal digestion, but is easily tolerated; associated or not with caffein, it seems well adapted to cases of mitral stenosis. It may be given as the tincture or fluid extract. I have prescribed the drug repeatedly for many years, and have been much pleased with its action on several occasions when I was really despairing as to what could be done to afford relief to a water-logged patient.

In mitral stenosis, the difficulty against which we are obliged to contend is not the dilated left ventricle, to which we wish to give strength and tenacity, but it is the tendency to pulmonary congestion, which throws more work on the right heart. If we attempt to increase the vigor of the right-heart contractions with the use of *digitalis*, while the lungs remain congested owing to the fact of the non-passage of a sufficient quantity of blood through a much narrowed mitral orifice in a certain length of time, the patient's distress is not relieved, but the dyspnœa from which he is suffering is frequently much increased. Aconite in small repeated doses is said occasionally to be of service under these conditions. I have never believed this observation to be correct, at least amongst adults; but, on the contrary, am of the opinion that the use of this drug merely aggravates the preceding condition by increasing vascular paralysis in the lungs. A far better method is to use repeated doses of nitroglycerin in all urgent cases and whenever the patient has been unrelieved by caffein and *convallaria*, and afterward to follow up the use

of nitroglycerin by the long-continued exhibition of strychnine or nuxvomica.

It has always appeared to me highly injudicious to make use of aconite in any appreciable dose in the treatment of any condition of failing heart strength, acute or chronic, particularly among adults. With children I am occasionally of a different opinion; but even such instances are rare in practice, and unless a child has a febrile state concomitant with the intra-cardiac condition, and which is apparently of ephemeral nature and without evident localization, I am loath even with them to give aconite, except in very small doses.

In certain cases of cardiac hypertrophy connected with or independent of a valvular lesion, aconite has been used by many practitioners with, as they believe, obvious benefit. The cases where this action seems most desirable are those in which the cardiac impulse is excessive and the patient is annoyed with the throbbing and pulsation in the chest, which apparently indicate excessive cardiac action. It is probable that this excessive action rarely occurs, and we should be very careful, in my judgment, of toning down the heart. If we must give a cardiac sedative, I attach far more value to the use of the mixed bromides than I do to aconite.

Of the bromides, I regard the salt of sodium as least likely to do harm, and I am sure that I have often given this remedy in large doses, ʒss-ʒj, several times in the twenty-four hours, without occasioning any cardiac depression. On the contrary, it has seemed to exercise a gentle, soothing, and quieting effect, which diminished the turbulent action of the heart without lessening its strength.

What is true of the bromides is also true of the valerianates—and valerianate of ammonia in pill form is a most valuable adjunct to our treatment in these cases. The excessive cardiac action may be attended with feelings of fulness or uncertainty in the head, and the tinnitus aurium from which such patients occasionally suffer is extremely annoying and objectionable. I have known these unpleasant sensations to be greatly diminished by salicylate of soda, with a small addition of phenacetine. Of course, the use of the latter prescription should simply be made while the aural and head symptoms are actually a source of great discomfort. As soon as they are dissipated we should interrupt their use.

In cardiac hypertrophy, as long as tension is kept up in the arteries, the prognosis is good, because we know that the general and cardiac nutrition are being sustained. Whenever this tension fails, by reason of the rupture or of the insufficiency of one of the coronary cusps, we know that the prognosis has become serious, and that the case will progress rapidly downward. Even under these conditions, we have tumultuous intra-thoracic throbbings, but they show not strength but weakness, and that weakness is of secondary degeneration, against which we should fight,

not with depressant agents like aconite and veratrum viride, but rather with heart tonics, like strychnine and iron, which in restoring vigor to the heart-muscle, lessen its impotent struggle, as shown by the dissipation of painful symptoms, which from a narrow and limited observation, appear to indicate nerve sedatives.

Whenever cardiac power is defective there is an insufficient quantity of blood sent out by its pulsations to the arteries which distribute themselves throughout the body. Owing to this insufficient distribution of arterial blood there is a marked tendency to venous engorgement everywhere. In the kidneys we have it, and albuminuria follows; in the stomach it is evident, and gastric catarrh results; in the liver the venous portal circulation is clogged, and soon the sclerotics are yellow, the tongue coated, and nausea and inappetence present themselves. With this marked, recurring, or almost constant venous engorgement of the viscera, fibrous changes occur in all these organs, and these permanent changes weaken and cripple them in their functional power to that degree finally that no remedies can ultimately afford relief, even to symptomatic disturbance.

Whenever in the conditions alluded to we have called to our help the power of digitalis, and instead of giving notable relief, it merely diminishes the pulse-rate so as to make it abnormally slow, we should abandon its use and recur to that of the other cardiac simulants. When we are assured that we have obtained good results we note easily a stronger heart-beat, an increased pulse tension, and a real compensatory hypertrophy. Doubtless, at the same time, the coronary arteries are filled with blood, the nutrition of the heart is improved, and the arterial recoil accentuated.

One of the bugbears of many practitioners relates to the so-called cumulative action of digitalis. As a fact, there is no more danger of this with digitalis than there would be in the case of many other heart tonics, if they were injudiciously managed, as is true whenever digitalis is followed by sudden poisonous effects of marked severity. Digitalis does not eliminate itself from the economy rapidly; and, of course, if we give large doses of it in short periods of time we may get untoward effects, just as we might if we gave arsenic or belladonna frequently, and without allowing time enough for their physiological elimination from the body. I must protest, however, against the notion still common with some practitioners, that digitalis has a way of its own of lying dormant for awhile, and afterward appearing suddenly, and springing, as it were, upon the poor victim, who will show signs of poisoning from its use. This idea is very erroneous, and should be combated forcibly whenever it appears. Of course, in certain forms of heart disease but for mechanical reasons, as in hypertrophy, we should be very temperate in our use of digitalis, or else we would do great damage. On the other hand, in cardiac dila-

tation it is more than doubtful whether we could really poison an individual with this drug unless we gave excessive, almost unjustifiable, doses. Even in cardiac dilatation, however, the use of digitalis must be intermitted when we have obtained desirable effects, or else we may occasion a return of cardiac palpitation and irregularity of the heart. Sometimes, with the presence of cardiac dilatation, we may have a cardiac systolic murmur at the apex, and after digitalis has been taken for a while the murmur disappears. This simply means that the cardiac ostium has become smaller through ventricular contraction so as to permit the valve to be competent once more. Again, sometimes, a murmur which did not exist at first, with evidences of cardiac dilatation, may become distinct after the continuous use of moderate doses of digitalis, and yet all the rational symptoms of cardiac incompetence previously observed by the patient have greatly improved or entirely disappeared. This means merely that the heart has obtained renewed power, that the muscular contraction of the heart-walls is greater, and that the blood when thrown through the enlarged or diseased orifice gives a murmur which was not noticed previously, because the heart had not force sufficient to produce it. The ventricle in the latter case also may show signs of diminution as to volume as well as increased force in its dynamic function.

There are many states of cardiac asthenia, as those resulting from effort or great and sudden shock, in which it is nearly impossible to recognize at once, or indeed, until the patient has been carefully observed for several days or weeks, what amount of disturbance is purely functional and what amount is occasioned by organic heart changes. Murmurs, intermittences, cardiac irregularities, combined with weakness of heart action, afford, at least, sufficient reasons to be doubtful as to the rôle each may play in the condition presented to us. Careful physical examination will not invariably enable us accurately to determine the size or precise state of the heart, owing perhaps to the corpulency of the individual, to intra-pulmonary conditions, to natural conformations of the chest-walls, to organic or functional disease of one or more of the abdominal viscera. When we are in reasonable doubt as to our diagnosis we should treat the case very much as we would if we were quite confident we had to do with cardiac insufficiency depending solely on organic heart disease. In fatty degeneration of the heart the cardiac stimulants are often necessary in order to increase rhythmic action through their influence on the intra-cardiac ganglia. Let us bear in mind, however, two considerations, both of which have their value: First, we can only help a fatty heart materially by stimulating its healthy fibres. Now we should not do this to an excessive degree, because we wish to save those which are degenerated from over-action, or increased pressure from within the cardiac cavity, or else we run great risk of in-

creasing cardiac dilatation, or else producing rupture, it may be, which would have a fatal result. In the second place, we are aware that it is not merely the heart which is implicated in fatty cardiac degeneration, the arteries are also affected with morbid alterations, usually of atheromatous nature. These changes may also occasion bad consequences if undue arterial tension is produced, as rupture in some of them—particularly the cerebral ones—is not uncommon.

These objections may be considered by some as more theoretical than practical, and as in no degree militating against the employment of cardiac stimulants when their use for other reasons seems advisable. In some cases of distended cardiac cavity through a vaso-inhibitory action upon the vessels, the arteries are somewhat distended. Digitalis by its power over the peripheral circulation appears to restore these vessels to their normal calibre, and hence its action under these conditions should be regarded as really injurious.

In cases where the heart seems rapidly to fail, as it frequently does where organic disease exists and an acute disease like pneumonia or typhoid fever is grafted upon it, digitalis appears at times to have considerable power in lowering the temperature and thus benefiting the patient. Clinically, the lowering of the temperature as well as the better condition of the patient seem to be accompanied by retained or increased arterial tension. When the arterial tension fails, not only is the condition of the patient, as a rule, unimproved, but the temperature does not appreciably fall. Perhaps this action of digitalis may serve to explain some remarkable effects occasionally obtained in the treatment of pneumonia and typhoid fever, which without this explanation would seem to be doubtful or mysterious. Of course, in considering such action we should have in view the effect of heart stimulants, not merely on one factor of cardiac power, but upon all—many of which are combined.

The heart, it is true, is a muscle, and upon this muscle digitalis, strychnine, convallaria, caffeine, etc., all act probably to a certain degree. But the heart muscle is controlled by the regular rhythmic discharges from its intrinsic ganglia, and these are probably even more effectively stimulated to action in fevers or disease of microbic origin by the cardiac stimulant than the muscle itself.

Belladonna is to-day often forgotten as to its beneficial action whenever neurosal difficulty is present in any condition of heart depression, without regard to the precise organic disease which prevails. Not many years ago belladonna was much lauded not merely for its valuable assistance in helping all cases of chronic heart disease where arterial tension was low and the quantity of urine daily voided quite insufficient; it was also admitted to be a very powerful agent for the relief of the effects of shock and when the patient was in a state of collapse which

threatened immediate death. Let us not forget, therefore, that, perhaps in many instances where we fail to obtain relief from other drugs, belladonna may afford us very valuable assistance. Fothergill insisted in his work on heart diseases upon the use to which belladonna might be referred, and, with what seems to be very clear insight, recommended it highly.

Not infrequently I have had good reasons to believe that our ordinary estimate of the value of belladonna is too low, and am convinced that if it were more frequently prescribed in connection with strychnine we should obtain very excellent results from it. In combination with iodide of potassium, it certainly gives marked relief to many cases of aortic disease in which part at least of the pain is apparently connected with a lack of synchronous rhythmic contractions between the two sides of the heart, connected with an insufficient or badly co-ordinated nervous control. Possibly, its stimulating effect upon the nervous centres controlling respiration may have also great value in the re-establishment of heart power and more perfect rhythmic action.

Few authors have insisted upon the value of electric currents as a means of restoring heart power. Reasoning from analogy, I am confident that we neglect too much this means of relief. I have seen such notable good effects both of faradic and galvanic currents in Graves' disease; it has been of such evident and great use to patients in whom the acute asthenia grafted on the previous cardiac changes was of imminent gravity, that I feel as if I have often neglected a means that would surely be helpful, if properly applied, when compensation is temporarily lessened or gravely impaired. One pole should be placed in the region of the neck, and the other over the cardiac region, and mild currents should be daily applied for a limited time. I trust that others besides myself will see the utility of electricity, and, it may be, obtain results from it in the treatment of organic heart disease which have not hitherto been secured.

The dyspnoea from which patients affected with chronic cardiac disease suffer, either continuously or spasmodically, is most distressing; sometimes it comes on in a sudden manner, perhaps in the middle of the night, with or without a sufficient apparent accidental cause to produce it. Frequently, however, these attacks follow imprudences in eating or drinking. Indigestible, rich food taken late at night, and after any unusual nervous strain is a frequent cause of similar attacks in the beginning of cardiac asthenia. During the attack the heart is unable to expel its contents, and the right heart particularly seems to be specially involved. The patients are anxious, distressed, panting for breath; the lips, face, and extremities are cyanosed; the hands are cold and clammy; there is often free perspiration from the face and neck; the pulse is feeble and irregular; they are often restless and uneasy and seek dif-

ferent postures to relieve their breathing; sometimes they sit up straight; often they bend over on a chair or head-rest, and fix their arms and shoulders so as to give them additional support, and thus enable them to use the accessory muscles of respiration. The heart's action is interfered with frequently by the bulging upward of the diaphragm, which cannot descend in the abdominal cavity, owing to gaseous distention of the stomach or colon. When the stomach is full of food and gas, nothing gives more immediate relief, at times, than to have it emptied by an attack of vomiting. On other occasions, the diffusible stimulants given internally, *i e.*, alcohol, ammonia, chloric ether, in frequently repeated doses, will be of almost immediate and great use. If the extremities are cold, hot-water bags or mustard poultices applied to them will help restore the circulation. When the attack is severe and the position of the patient imminently threatening, hypodermatics of brandy, nitroglycerin, strychnine, or digitalis should be given and repeated several times until the patient notably revives. The quantities of these drugs which can be given to these patients with evident relief is often very large. Of course, such attacks vary greatly as to their gravity, and in some instances life itself hangs upon a thread. I have seen patients more than once remain in a semi-collapsed condition several hours and only revive thoroughly after I and others had expended all our efforts in their behalf.

In dyspnœa of more chronic nature we find that pulmonary congestion, bronchitis, cardiac dilatation or effusion into the pleural cavities are frequent causes of it. Any of these thoracic complications may be accompanied also by a renal affection which renders the treatment more difficult and the prognosis graver—sometimes the patient cannot lie down at all for many nights. This position, often so painful to the patient, is measurably relieved by a good bed-rest, with arms at the side to prevent the patient's head or body from falling over or taking a position which greatly increases the difficult breathing. Hypodermatics of morphine with atropine will sometimes quiet and subdue these attacks very rapidly. When these drugs fail to relieve in appropriate doses, nitroglycerin is available and most reliable. This is particularly true if the tension of the radial pulse is high and there is clearly present a state of advanced arterio-capillary fibrosis.

Whenever there is a moderate or large amount of fluid in one of the pleural cavities, thoracentesis repeated one or more times, gives great relief to the breathing, and prolongs life many months in some instances. Warm poultices, with the addition of mustard in moderate proportion to the chest walls, is a very excellent means to give relief to distressed breathing. Repeated applications of dry cups to the chest or over the renal region are of great value.

As soon as the acute dyspnœa is relieved a free purgative dose with

calomel and compound jalap powder will carry off considerable fluid from the economy, and thus afford sensible relief. Hoffman's anodyne in full doses will often quiet extreme restlessness and promote sleep, besides being of great service in lessening dyspnoea of functional character and nervous origin, although connected with organic heart disease. If there is much venous engorgement we can obtain more relief by blood-letting than in any other way. Leeches, wet cups, venesection, may all be used in certain cases with great advantage to the patient.

I have also known oxygen inhalation to be successfully employed. Again, even when there is much bronchial engorgement, oxygen will fail to produce any amelioration in the patient's condition. We are, indeed, compelled to abandon its use at times on account of increased distress which it evidently occasions in the breathing. Inhalations of nitrite of amyl, the internal use of the bromides and chloral are resorted to by me with evident great resulting benefit in some instances. In the use of chloral one must be guarded whenever there is danger of heart-failure from organic cardiac disease, as the heart may suddenly be arrested in diastole. Cardiac dyspnoea is frequently aggravated by an underlying gouty condition, by hysteria, or emotional excitement, and may be greatly relieved by appropriate medication addressed to these diverse causative conditions.

The condition of the stomach and liver is also very important, and a vomitive or purgative given at the proper time is able to afford much relief, when otherwise the patient's distress would continue. It is wise in many such cases to be cautious in rendering too grave a prognosis, as the occasion does not always warrant it, and with judicious treatment the patient may rapidly improve.

A CASE OF ACUTE ULCERATIVE ENDOCARDITIS DUE TO THE BACILLUS DIPHTHERIÆ.

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ALTHOUGH this case has been published elsewhere in abstract,¹ I wish to record it now in full, as it is not only the first reported case of endocardial lesion due to the bacillus diphtheriæ, but it is the first time that this organism has been found associated with lesions of any of the internal organs other than the lungs; and for these reasons it must be regarded as a unique case.

¹ Studies in Diphtheria. The Johns Hopkins Hospital Bulletin, April, 1893, No. 30.

The case occurred at St. Joseph's Hospital, Baltimore, in the service of my colleague, Dr. Frank A. Warner, by whose courtesy I am enabled to report it.

Constantine B., a Russian Pole, laborer, aged thirty-four years, married, was admitted to the hospital November 7, 1892, complaining of weakness, headache, and diarrhoea.

Family history. His father is living and healthy. His mother died with some disease of the eye. He knew nothing of his grandparents. One brother and one sister died in childhood; cause unknown. One son died in infancy. The patient denied having had any previous disease, and said that he had always been strong and healthy. His present disease began on November 1, 1892, when he was taken ill with severe chills, high fever, nausea and vomiting, diarrhoea, and with pains in the head, limbs, and abdomen.

On admission, at 6 P.M., November 7th, his temperature was 100.5° , his pulse 84 per minute, and his respirations accelerated. The eyes appeared normal. The skin was hot and dry. There were no wounds, spots, or hemorrhages in the skin anywhere. The lips and mucous membranes were pale. The tongue was dry, its edges red, its dorsum coated with a yellowish-brown fur. The mucous membrane of the mouth and pharynx appeared normal. The examination of the lungs was negative. The apex-beat of the heart was in the fifth intercostal space just within the nipple-line. The cardiac dulness began at the upper border of the fourth rib, the left sternal border, and extended to the apex. Both sounds were clear at apex and base. The second sound at the pulmonary cartilage was accentuated. The liver dulness extended from the upper border of the seventh rib to the costal margin in the mammary line. The splenic dulness was obscure, the spleen was not palpable. The abdomen was resonant throughout. There was no gurgling or tenderness in the right iliac fossa. The urine was negative.

A note made on November 18th showed that his state remained very much the same; but there was now some tympanites and some gurgling in the right iliac fossa. The tongue was dry and red. The temperature had been ranging about 102° in the evenings, the pulse was 84 and of fair volume. Examination of the heart and lungs was negative.

On November 21st he was worse, his pulse was 120 and of poor volume. Heart and lungs negative.

November 24. The patient has lost ground steadily the last three days. His temperature was subnormal and his pulse 150° and very weak. Albumin was found in his urine to-day. He died during the night of the 24th.

The autopsy was made by me eight hours after death.

Anatomical diagnosis. Acute ulcerative endocarditis with extensive thrombus formation of the superior surface of the mitral valve. Slight vegetative endocarditis of the aortic valve. Congestion and œdema of the lungs. Acute and chronic nephritis. Acute splenic tumor. Embolism of the splenic and renal arteries; infarction of the spleen and kidneys. Acute parenchymatous degeneration of the liver, kidneys, and heart. Septicæmia.

Body 170 cm. long, well built; not emaciated. There are no œdema and no ecchymoses or other discoloration of the skin. The skin is pale. The pupils are dilated.

The brain and cord not examined. The subcutaneous fat is well developed. There is no oedema of the abdominal or chest walls. The muscles are pale.

In each pleural cavity there are a few cubic centimetres of clear serum. The pleural surfaces are smooth and free from adhesions. Both lungs are crepitant throughout. They are congested, especially at the bases and posterior portions of the lower lobes. The mucous membrane of the bronchi is red and somewhat swollen. Both lungs and the bronchial glands are deeply pigmented. On careful examination small ecchymoses are seen on the pleural surfaces.

The pericardium contains about fifty cubic centimetres of clear serum. Both layers are smooth and present small points of ecchymosis, which are best marked over the epicardium of the left auricle.

The left ventricle is rather strongly contracted. The heart is larger than normal and weighs 350 grammes. The myocardium is of a pale-red color and is less firm than normal. All the cardiac cavities contain dark fluid blood and yellowish-white clots. On opening the left auricle there is seen to project through the auriculo-ventricular orifice a granular-looking and in some places mottled gray and red thrombus mass, which completely closes the orifice. This mass is everywhere intimately adherent to the superior or auricular surface of the mitral valve. On opening the ventricle the whole area of this surface of the valve is seen to be covered with this intimately adherent and generally grayish white thrombus mass, which presents in places a few granulations. This mass varies in thickness from 2 mm. to 1 cm. On incision it is found to be thickest about the middle of the valve. At many points it becomes thinner along the free margins of the valve, and is then often continued down on the chordæ tendinæ. At the base of the valve toward the auriculo-ventricular ring on the superior surface the endocardium at the margin of this thrombus mass is curled up, leaving a red, roughened surface of ulceration. The thrombus is thickest over the anterior segment, and from here it sends down a teat-like projection, 5 mm. in diameter at its base, into the cavity of the ventricle. The two segments of the valve are bound together by the thrombus mass, which on incision is tough and dense and of a grayish-white appearance. At the point of juncture between the thrombus and the ulcerated valve the tissue is red and injected.

The inferior or ventricular surface of the valve presents a few small granular elevations, which on removal leave a red ulcerated surface. Otherwise this aspect of the valve is normal.

When the surfaces of the thrombus are brought together by closure the mass measures 17 mm. in diameter. At least half the diameter of the orifice is obstructed by the thrombus.

Along the ventricular aspect of the aortic valve, just below the level of the corpora Arantii, there is a narrow row of exquisite, minute fresh vegetations of a light-red color. The rest of the valve is unchanged and there are no uncovered points of ulceration.

In the meshes of the columnæ carnæ of the left auricle and ventricle there are soft grayish-white non-adherent coagula. The parietal endocardium elsewhere is normal and presents no ulcerations.

The right auricle and ventricle contain dark fluid blood and non-adherent coagula. The valves and the walls are normal. The auricular appendages contain non-adherent clots, but no thrombi.

There is slight hypertrophy of the left ventricle. The circumference of the mitral valve is 9.5 cm.; of the tricuspid, 11 cm.; of the aortic, 7 cm. The coronary arteries are normal, as are the aorta and the pulmonary artery.

The liver is large, and projects below the costal margin in the mammary line. The edges are round, the surface smooth. On section the surface is pale and opaque. The lobules are visible. There is no apparent connective tissue increase, and no areas of necrosis. The consistence is normal. In the gall-bladder there is a small amount of bile, of a syrupy consistence. The gall-bladder and the bile-duct are normal. The spleen is large, weighing 400 grammes and measuring 15 x 10 x 4.5 cm. The surface in general is smooth, with here and there small scattered pale gray points in the capsule. The notch is well marked. On section the organ is of a dark red color, in general, with here and there lighter areas. The organ is soft, but not diffuent, and throughout nearly its whole extent is the seat of infarction. The trabeculæ are visible, the Malpighian bodies not. In the larger branches of the splenic artery there are white and red thrombus masses, which are often intimately adherent to the vessel wall.

The kidneys are of about the same size and general appearance. They are smaller than normal, and together weigh 320 grammes. The capsules are readily removed. The main trunk of the renal artery of each side is normal; but in both kidneys in many of the branches of medium size there are grayish-white embolic masses which completely plug the lumen. Some of these masses can be pressed out, others are firmly adherent to the vessel walls. Beneath the surface of both kidneys, scattered everywhere, there are points of ecchymosis. At the middle of the convexity of each organ there is a large, raised yellowish-gray area, with dark red margins. These areas extend over a large surface, and the one in the left kidney involves fully one-sixth of the organ. On section of the kidneys these areas are seen to be irregularly triangular in outline. They are of a yellowish-gray color, and are firmer than the rest of the kidney tissue. These extensive infarcts involve both medullary and cortical tissue. Scattered over the surface and through the organs there are numerous smaller white infarctions, which, like the large ones, are surrounded by a dark hemorrhagic zone. These hemorrhagic zones are especially well marked just beneath the surface of the organs.

At one place the infarcted area is extensively softened, and is bordered by a deep hemorrhagic zone, giving somewhat the appearance of a recent corpus luteum. The cortex of both kidneys, where not involved in infarctions, is swollen, pale, and opaque. The striæ are indistinct, the glomeruli appear congested. The medullary portions of the kidneys are congested.

The pelves, ureters, and bladder are normal.

The pancreas, adrenal bodies, and testes are normal.

The mucous membrane of the stomach is injected. The duodenum and the jejunum are pale. In the ileum and in the upper part of the large intestine the solitary follicles are swollen and congested, but present no sign of ulceration. The Peyer's patches just above the ileo-cæcal valve are swollen and red.

The mesenteric glands are not specially enlarged.

The pharynx, tonsils, and the mucous membrane of the larynx and

trachea present no pathological changes. The nasal fossæ and the vault of the pharynx were not examined.

Fresh frozen sections of the heart, liver, spleen, and kidneys were studied, but as the various histological changes found showed very much better in hardened sections, a description of the microscopical appearances of the fresh tissues is omitted.

Cover-slip preparations made at the time of the autopsy from the mitral valve, the spleen, and the kidneys, showed in great numbers and in pure cultures a bacillus of the size and morphological appearances of the bacillus diphtheriæ. Cultures were made at once, with the usual precautions, on plain agar-agar from the ulcerated surface of the mitral valve, and from the lungs, spleen and kidneys. After twenty-four hours in the thermostat there were numerous small isolated colonies in each tube. Cover-slip preparations from a number of these colonies showed always the same organism, which had the same appearance as those seen in the cover-slip preparations from the fresh organs.

The bacillus was non-motile. It varied in shape and size. It occurred both on coverslip preparations made from cultures and in sections from the mitral valve and the kidneys, usually as a straight rod with rounded ends, but it often assumed irregular and bizarre shapes. In some one or both ends were swollen; in others, portions of the bacilli stained more deeply than others, giving a beaded appearance to the organisms.

The bacillus from cultures and in the tissues stained well and clearly with Gram's method and with Weigert's fibrin stain.

On glycerin agar-plates, after remaining twenty-four hours in the thermostat, the colonies were round or oval, elevated and coarsely granular, with ill-defined borders. The superficial colonies were large, very coarsely granular, and irregular in outline. With the naked eye the colonies were grayish-white in color. On slanting glycerin agar and plain nutrient agar the growth was abundant, and made up of small well-defined grayish-white colonies. The bacillus grew well on gelatin.

In alkaline bouillon the growth occurred as small, irregular, grayish-white specks at the bottom and along the sides of the tube. The bacillus grew well on steamed potato, and could be cultivated for generations on this medium. The growth was, however, always invisible. There was a rapid and luxurious growth on blood-serum.

The organism was cultivated on a variety of media side by side with cultures of the bacillus diphtheriæ obtained from undoubted cases of primary faucial diphtheria, and was always found to be identical in both its morphological and cultural properties with that organism.

After repeated experiments this bacillus has failed to kill guinea-pigs and rabbits.

Portions of the mitral valve, of the left ventricle, of the lungs, liver, spleen, and kidneys, and other organs were hardened in alcohol. Sections of these were stained with hæmatoxylin and eosine, methylene-blue and eosine, and with Weigert's fibrin stain, and studied.

Heart. For histological study sections were made at several places perpendicularly through the mitral valve and the superimposed thrombus mass. These sections included, in addition to the thrombus and the whole extent of the valve, corresponding portions of the endocardium and the musculature of the left auricle and ventricle. The starting-point of the process on the valve could be best studied near the base of the valve, just below the auriculo-ventricular ring, for here it is more recent, and

its various steps can be accurately traced. The lesion is somewhat irregular in extent, extending higher up toward the base of the valve in sections made from some places than in those made from others. In sections made through the posterior segment the change in the valvular tissue extends almost to the base of the valve, and in sections made from the anterior segment not quite so far. In these sections beginning near the base of the valve there are various changes to be noted in the endothelial cells of the endocardium. In many of them the nucleus stains poorly, and the surrounding protoplasm is swollen and granular; others have lost their nuclei; many of the cells are desquamated. In some of the cells bacilli can be made out. These are more numerous in the desquamated cells. At this point there are no changes to be noted in the underlying tissue of the endocardium. Farther down, and beginning just above the thrombus mass, there is a large area very rich in cells, which extends through the entire thickness of the endocardium. Here the endothelial cells are entirely lost, only a few swollen, granular-looking, desquamated ones being made out. At this point there is seen in all the sections examined a considerable local reaction, shown by a great increase in the number of cells. These cells are for the most part polynuclear leucocytes, but there are a considerable number of round cells of about the size and appearance of large mononuclear leucocytes, and some more or less spindle-shaped cells. This cell-infiltration here involves the whole thickness of the endocardium proper, and in some sections the underlying muscle tissue as well.

The cells are more numerous toward the free border, where the polymorphous nuclear variety predominate, and they gradually lessen in number toward the muscle tissue and toward the base of the valve. Along the free edge and extending to some depth, there is a well-marked nuclear fragmentation. Some of the cells have lost their nuclei, and the latter lie free in the tissue. These fragments may appear as round, highly refractive, intensely staining dots, or may assume very irregular and bizarre shapes. In places the tissue in which the cells lie is hyaline, staining diffusely with eosine, and showing characteristic threads of fibrin with Weigert's fibrin stain.

Both at the margin of this area, and extending a considerable distance into the tissue, bacilli can be made out. The bacilli lie both inside the cells and free in the tissue. This area is covered by a pseudo-membrane, that is continuous with that covering the rest of the valve and forming the thrombus mass. At this point the pseudo-membrane is composed of a dense mass of fibrin laid down in successive layers, and staining diffusely with eosine, and characteristically with Weigert's fibrin stain. In between the meshes of the fibrin layers there are numerous cells, both large mononuclear cells and polymorphous-nuclear leucocytes, the latter variety predominating. Many of the cells contain bacilli in numbers. In the fibrin meshes there are also parts of disintegrated cells, free nuclei and fragmented nuclei. These latter often assume bizarre shapes, and they stain intensely with aqueous fuchsine and alkaline methylene-blue. Numerous bacilli appear in scattered clumps and in large zoöglea masses.

Below the area of cellular infiltration described in the endocardium, this membrane throughout its whole extent on the upper surface of the valve is hyaline, and stains diffusely with eosine, and very few nuclei can be made out. The endothelial cells on the free surface are entirely lost, and between this hyaline material and the thick thrombus mass there is

an irregular, thick line, staining deeply with the aniline dyes, and which is made up of myriads of bacilli. As the free or unattached end of the valve is approached, in addition to the endocardial tissue, the underlying muscle tissue of the valve to a considerable depth is hyaline, and contains no well-preserved nuclei. There are some fragmented nuclei to be seen. This hyaline material stains diffusely and characteristically with eosine and with picric acid. At the edge of the valve, in sections made from various places, this hyaline tissue is covered with a mass of fibrin laid down in successive layers, and containing in its meshes numerous cells and bacilli. The cells here are in various stages of degeneration; many are swollen and granular, and contain bacilli. There is an intense nuclear fragmentation, and many free nuclei are seen. These cells are for the most part polymorphous nuclear leucocytes. At the margin of the free end of the valve, under this pseudo-membranous formation, there is a considerable local reaction, which is in many respects similar to the area described near the base of the valve. The chief point of difference is that here there seems to be a complete necrosis of the tissue of the part. The outlines of the cells are lost, the nuclei stain poorly, and there is an exquisite nuclear fragmentation, the fragments often taking bizarre shapes. The tissue stains diffusely with eosine and picric acid. The thrombus mass, which covers the whole of the upper or auricular surface of the valve, is composed of this fibrin formation containing cells, and of a diffusely staining mass of fibrin containing myriads of bacilli. These latter form a deep and irregular line along the free surface of the thrombus. Everywhere in the fibrinous material they are diffusely scattered in irregular clumps and in large zoöglea masses. In sections stained with eosine and methylene-blue or hæmatoxylin, the hyaline fibrinous material stains homogeneously, and the bacilli take up the nuclear dye intensely. With Weigert's fibrin stain the hyaline material is seen to be made up of threads and bands of fibrin, and the bacilli stain deeply. In the outer portions of the thrombus but few cells are seen, and these are of the polymorphous-nuclear type only.

In all the sections studied the muscle cells of the musculature of that portion of the auricle included in the sections are normal. There is a slight fibrous myocarditis.

The muscle tissue of the valve itself presents a striking change. That portion of the muscle tissue just beneath the necrotic endocardium, toward the outer or free edge of the valve, is in all the sections studded hyaline, and stains diffusely. In several places there are small collections of red blood-corpuscles that still preserve their form.

In sections from one place there is on the under or ventricular surface of the valve near its free edge an area of cell infiltration, with loss of the endothelial cells and with nuclear fragmentation. There is a pseudo-membranous formation on the surface here. The process at this point is recent, and is similar to that seen on the upper surface near the base of the valve. At several places midway in the thickness of the valve there are focal areas of necrosis of the muscle-cells, with nuclear fragmentation. About these areas there are polymorphous-nuclear leucocytes in various stages of degeneration. No bacilli are made out in these areas. In still other places there are areas of cellular infiltrations with proliferation of the fixed cells and the presence of polymorphous-nuclear leucocytes. Many of the cells are degenerated, and there is considerable nuclear fragmentation. In the centre of one of these areas, which can

be traced through a number of sections, there is a bloodvessel filled with a large zoöglea mass of bacilli. There are few bloodvessels present in the sections examined, but those seen are large and evidently dilated.

The bacilli described in the process on the valve are in pure culture and are morphologically identical with those in cover-slip preparations made in the fresh state and with those grown in the cultures made at the autopsy.

Kidneys. Study of sections made from portions of the kidneys not involved in infarctions shows in some glomeruli thickening of the capsule of Bowman, with some desquamation of the capsular epithelium. The glomeruli show an increase of cells, and they nearly fill the capsules. In some very thin sections stained with eosine and methylene-blue the capillaries are seen to be distended with blood and to contain large numbers of polymorphous nuclear leucocytes. Here and there a few bacilli can be made out inside the capillaries. There is no necrosis of cells to be made out in the glomeruli. The afferent vessels are distended with blood.

The intertubular connective tissue is increased in amount. The epithelial cells of the tubules are swollen and granular. The lumina of the convoluted tubules are in many places completely filled with these swollen and granular cells. In many tubules the epithelial cells are detached in large numbers from the basement membrane. The nuclei often stain badly and in some cells not at all. In some tubules scattered bacilli can be made out. There is no nuclear fragmentation. Scattered throughout the kidneys there are numerous areas of hemorrhage into the tubules. In these areas the tubules are distended with blood, and the epithelium is flattened out or completely lost, and inside some of the tubules so affected numerous bacilli are seen. These hemorrhagic areas are more numerous in the cortex near the surface of the kidney. The vessels just under the capsule are distended, and here and there there is hemorrhage into the surrounding tissue.

Sections cut across a large branch of the left renal artery present a peculiar appearance. In the side of the vessel nearest the cortex and occupying about one-fourth of the lumen of the vessel there is a mass of red blood-cells containing large numbers of polymorphous nuclear leucocytes, which are for the most part massed in clumps containing both free and fragmented nuclei. In this area a few bacilli are seen. The rest of the lumen of the vessel is filled with a mass of hyaline material staining diffusely with eosine and showing characteristic fibrin threads with Weigert's stain. In this material there are enormous numbers of bacilli usually in large zoöglea masses. In the fibrin meshes there are many polymorphous-nuclear leucocytes, which are often massed together, and which show a well-marked nuclear fragmentation. These leucocytes are especially numerous and form a thick line at the junction of the line of red blood-cells with the fibrinous material. That portion of the vessel wall in relation with the mass of red blood-cells appears normal. The rest of the wall of the vessels presents an interesting picture. Here there are various changes met with in all three coats.

On one side, at a point where the fibrinous material joins the mass of red blood-cells and between the latter and the vessel wall, the endothelial cells of the intima are for the most part desquamated. Those remaining attached are swollen and granular. The desquamated cells lie in the fibrinous material, are swollen and granular, and many have lost their

nuclei. Some contain bacilli, which often have a transverse, beaded appearance. Extending from this point all the way around the side of the vessel until the mass of red blood-cells is reached again, the endothelial cells are lost over large areas. In many places the fenestrated membrane of the intima is stripped off. Around the whole of the three-fourths of the circumference of the vessel where these changes in the intima are noted there are large numbers of polymorphous-nuclear leucocytes and bacilli imbedded in the fibrinous material already described. Just here there are many leucocytes and endothelial cells containing bacilli. Throughout this three-fourths of the circumference of the vessel the media is the seat of a peculiar change. Here, forming a line between the junction of the intima and media, there are a large number of cells. These are especially numerous in those places where the fenestrated membrane is lost.

The muscle-cells at these points have lost their nuclei and stain diffusely with eosine; there is also considerable nuclear fragmentation, but it is never so extensive as that seen outside the intima and in the mass of fibrin. The cells above described are for the most part polymorphous-nuclear leucocytes; but there are also many large, round cells with large single nuclei. Here and there in these areas of cellular infiltration bacilli can be made out, but they are never numerous. In some places the leucocytic invasion can be traced down along the muscle bands to the adventitia. At one point and over a considerable area the muscle-cells of the whole thickness of the media are hyaline, have lost their nuclei, and there is considerable nuclear fragmentation. Here there are a large number of leucocytes, and a few bacilli can be made out here and there. The adventitia shows a recent proliferation of the fixed cells, and the tubules in the neighborhood are atrophied. Nowhere can one trace leucocytes entering the media from the adventitia.

Sections cut through a large infarction extending through the medulla and the cortex of the left kidney show many interesting changes. The cells of the kidney tissue in this area are entirely necrotic and stain deeply with eosine. Only here and there do the nuclei stain at all. In many places the tubules are filled with a hyaline material which stains diffusely with eosine. In sections stained with Weigert's fibrin stain these hyaline masses are seen to contain many fine threads of fibrin. A fibrinous network can also be made out between the tubules both in the intertubular tissue and inside of the small bloodvessels. These latter are distended and the nuclei of the cells of their walls do not stain. The cells of the glomeruli in this area are necrotic and their nuclei do not stain. The glomerular capillaries are often filled with threads of fibrin. All through the infarcted area there are great numbers of bacilli, which are seen in scattered clumps and in large zoöglea masses. These lie inside of the tubules, in the intertubular tissue inside the capillaries and small vessels. Many of the glomeruli contain large masses of bacilli; indeed, in some glomeruli nothing can be seen but a large zoöglea mass of bacilli.

In the centre of the infarcted area no leucocytes are seen. Along the border of the infarct there is a dense infiltration, with polymorphous-nuclear leucocytes, with a great deal of nuclear fragmentation. In some places this leucocytic infiltration can be traced for some distance into the infarcted area. Here two appearances are met with. In some places about a dense mass of bacilli which lie in a glomerulus, in tubules,

in capillaries, or, as often occurs, in the intertubular tissue, there is seen a dense infiltration, with polymorphous-nuclear leucocytes. Many of the nuclei of these cells lie free in the tissue, are fragmented, and show bizarre shapes. In most of these areas the tissue is hyaline and necrotic, and stains diffusely with eosine, and with Weigert's fibrin stain fine fibrin threads can be made out. In other places, extending for some distance into the infarcted area, the capillaries and small bloodvessels are distended, with large numbers of polymorphous-nuclear leucocytes.

The area of infarction does not extend quite to the free border of the cortex, for nearly everywhere just under the capsule the tissue cells stain well. The vessels here are distended with blood, and some of the capillaries can be traced running down into the infarcted area. The endothelial cells of the walls of these vessels stain well; their lumina contain red blood-corpuscles and great numbers of polymorphous-nuclear leucocytes. In places there is hemorrhage into the tubules and into the intertubular tissue. Often polymorphous-nuclear leucocytes, free nuclei, and nuclear fragments can be made out in the hyaline contents of the tubules and in the intertubular tissue at this border of the infarction. In most of the sections studied the line of the infarction is clear cut. In some sections the leucocytic invasion extends for some distance into the infarcted area.

The bacilli seen in all the sections of the kidneys are invariably morphologically identical with those described on the heart-valve and obtained in the cultures. They are the only kind of bacteria present.

Liver. The liver cells are swollen and granular, but their nuclei stain well. In many places the cells are filled with bile pigment. The capillaries are wider than normal, and contain red blood-cells and large numbers of polymorphous-nuclear leucocytes. The central veins of the lobules generally are distended; some are very much so. In some sections the lumina of the central veins, beside red blood-cells, contain many large cells of the size and appearance of liver-cells. The nuclei of these cells do not stain with the nuclear dyes, and the cell bodies stain diffusely with eosine. In these areas the liver cells around the central vein, to the depth of several rows, present the same characters. In these areas there is no nuclear fragmentation and no leucocytic infiltration. In one section there is an area near a central vein in which the nuclei of the liver-cells do not stain; the cell bodies here stain deeply with eosine. In this area there is no leucocytic invasion and no bacilli are seen.

A few scattered bacilli can be made out here and there in the liver capillaries. In some sections large zoöglea masses are seen. In sections stained with Weigert's fibrin stain no fibrin can be made out in the liver. There is some increase of connective tissue in the portal systems.

Spleen. In the infarcted areas of the spleen the tissue is filled with red blood-cells and polymorphous-nuclear leucocytes, accompanied by an extensive nuclear fragmentation. Tissue stains deeply with eosine, and in sections stained with Weigert's fibrin stain a great deal of fibrin is seen both in and outside of the capillaries. Bacilli are seen in great numbers, both in scattered clumps and in large zoöglea masses, both in the bloodvessels and free in the tissue. Scattered in the splenic pulp there are numerous peculiar crystalline masses. They are of an orange color, and have the appearance of a mass of thread-like lines radiating from a common centre.

Lungs. Microscopical examination of sections of the lungs shows

nothing of special interest. There is a slight amount of chronic interstitial pneumonia, with deep pigmentation. In places, small hemorrhages into the pleura cannot be made out. The bloodvessels about these areas are dilated.

The epithelial cells of the bronchi are swollen, and in some places desquamated. No bacilli are seen in the capillaries or in the larger bloodvessels.

The bacillus found in such great numbers in this case has been carefully studied by Prof. Welch, by myself, and by several other workers in his laboratory, and none of us has been able to distinguish any difference between it and the bacillus diphtheriæ obtained from typical cases of primary faucial diphtheria, either morphologically or by cultural methods. It has invariably reacted typically to all the cultural and staining tests known.

Dr. A. C. Abbott, of the Laboratory of Hygiene of the University of Pennsylvania, has also failed to distinguish it by these methods from the ordinary bacillus diphtheriæ. Furthermore, he has found that the bacillus of my case shows the same reaction described by him as to change of form as does the ordinary bacillus diphtheriæ on changing it from blood-serum to glycerin agar-agar, and *vice versa*. Abbott¹ has found that the long, clubbed, irregularly staining individual bacilli diphtheriæ seen in cultures made on blood-serum, when transferred to and grown on glycerin agar-agar are far less voluminous, much shorter, and many-shaped. The reverse he found to occur when bacilli previously grown on glycerin agar-agar were transferred to blood-serum.

The bacillus of this case, even when large doses were used, has not proved pathogenic for guinea-pigs or rabbits. Animals kept for months after inoculation are alive, and show no paralysis.

These facts bring up the interesting question of the existence of a true bacillus diphtheriæ pathogenic for human beings and not for animals.

Abbott,² in August, 1891, reported two cases of primary faucial diphtheria which bear upon this point. In the first case he obtained a bacillus, the only difference between which and the bacillus diphtheriæ was that it was not pathogenic for animals. The bacillus of the second case showed a more luxuriant growth than usual on various media and a visible growth on potato, and also failed to kill animals.

Abbott³ has lately reported two cases of membranous rhinitis, in both of which the bacillus diphtheriæ was found. Cultures from one case killed guinea-pigs in forty-eight hours, and cultures from the second case failed to kill these animals.

The behavior of the bacillus found in my case goes to strengthen the

¹ Abbott: Journal of Pathology and Bacteriology, October, 1893.,

² Abbott: Johns Hopkins Hospital Bulletin, August, 1891.

³ Abbott: Medical News, May 13, 1893, vol. lxii., No. 19.

argument that the intensity of the virulence of the bacillus diphtheriæ fluctuates.

The fact that the patient was affected twenty-four days before death occurred, and the absence of any mechanical interference to the circulation on account of the valvular lesion, together with the histological appearances of the process on the mitral valve, would seem to show that the organism concerned in the etiology of the affection was not possessed of a high degree of virulence. These facts, added to the state of the process in other organs, point rather to a gradual loss of resistance on the part of the individual, which finally allowed such a rapid multiplication of the bacilli on the heart valve as to produce a genuine septicæmia, and finally extensive infarctions in the spleen and kidneys. It is probable that the large area of renal territory comparatively suddenly thrown out of use as the result of the numerous and large infarctions, together with the acute nephritis present, was the immediate cause of death. The individual was able to resist the bacilli for some time, and it was only after this resistance was exhausted by a prolonged struggle that the bacilli and their products were capable of multiplying to cause septicæmia and embolic processes.

The length of time that the bacilli remained in the body may explain their lack of virulence for animals. The fact that the bacilli found in this case were not pathogenic for rabbits and guinea-pigs strengthens the position of those observers who hold that the lack of pathogenicity for animals in a bacillus otherwise identical with the bacillus diphtheriæ is not sufficient ground for classing it with the "pseudo-diphtheria bacillus."

It is well known that various bacteria obtained from a variety of lesions in the human being often fail to kill animals. I have several times found that large numbers of pneumococci obtained from the lungs of fatal cases of pneumonia have failed to kill, or even to produce local reaction in rabbits.

It is now generally recognized that bacteria when obtained from old lesions, as, for instance, pneumococci from the gray hepatization of pneumonia, frequently lack virulence for animals. What happens with the pneumococcus and other pathogenic bacteria in this regard may well obtain for the bacillus diphtheriæ.

While this is the first case in which the bacillus diphtheriæ has been obtained from lesions of internal organs other than the lungs, Frosch¹ has cultivated this organism from various internal organs in ten out of fifteen cases of ordinary diphtheria. Other observers have reported single cases in which they have gotten similar results.

Booker² has lately published a case of primary laryngeal diphtheria,

¹ Frosch: Zeit. f. Hygiene u. Infektionskrankheiten, 1893, Band xiii., pp. 49-52.

² W. D. Booker: Archives of Pediatrics, August, 1893, vol. x., No. 8.

in which he obtained pure cultures of the bacillus diphtheriæ from one of the submaxillary glands and from the spleen.

When the suggestion of Frosch, that comparatively large pieces of organs are to be used in making cultures in these cases, is generally adopted, it will probably be found that the bacillus diphtheriæ obtains entrance into the circulation, in fatal cases at least, with greater frequency than is commonly supposed.

The absence of any demonstrable infection atrium in my case leaves us in the dark as regards the mode in which infection took place.

Not until other cases of infection of internal organs by the bacillus diphtheriæ have been observed can the interesting question of the modification of the virulence of this organism when subjected to prolonged habitation in the human body and the action of the blood-serum be cleared up.

The examination of sections from the various organs affected shows that the lesions due to, and the reaction of the tissues to, the organism found are identical with those described by Oertel¹ for diphtheria in man, and by Welch and Flexner² for experimental diphtheria in animals.

It is interesting to note that the lesions found in the thrombosed renal artery were identical with those described on the mitral valve, though evidently of more recent date. The great number of bacilli seen in the infarcted areas in the kidneys cannot have been due solely to conveyance by emboli, but must have in large part depended upon a rapid multiplication of the organisms brought to the tissue with the embolic masses after the normal resistance of the tissues was destroyed by the necrosis resulting from the infarction.

The hemorrhage into that part of the kidneys not involved in infarctions is readily explained by the direct action of the bacilli and their products upon the cells of the vessel walls. The destruction of renal tissue by the action of the bacilli and their toxins was extensive.

The histological changes in the liver were not so marked or so far advanced as the lesions usually occurring in this organ as the result of the toxins of the bacillus diphtheriæ, but there was a considerable amount of focal necrosis of liver cells, especially about the central veins of the lobules. There was no leucocytic infiltration of these areas.

It is interesting from the clinical side to note that there were no positive signs of valvular disease. No murmur was heard; there was absence of cardiac embarrassment, and the pulse was regular and but little accelerated until the last few days of life.

¹ Oertel: Die Pathogenese der epidemischen Diphtheria. Nach ihrer histologischen begründung. Mit Atlas. Vogel, Leipzig, 1887.

² Welch and Flexner: Johns Hopkins Hospital Bulletin, No. 15, August, 1891. Also *ibid.*, No. 20, March, 1892.

RECENT EXPERIENCE WITH TUMORS OF THE LIVER.

BY JOHN B. ROBERTS, A.M., M.D.,
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My service at the Woman's Hospital of Philadelphia has afforded me during the past fall and winter opportunity of studying several cases of tumor involving the liver, which have greatly interested me. Some of the cases appear to be quite rare, and in all of them the diagnosis was to me a valuable study. I fortunately was able to secure specimens in each of the cases in which death took place. I shall report the clinical histories somewhat in detail, because of the unusual character of the pathological conditions.

Cystic adenoma of the liver, of probable coccidial origin, treated by incision; one cyst apparently containing gas. This case was reported by me at the meeting of the Philadelphia Academy of Surgery of November 6, 1893, and was subsequently published in the reports of the meeting in various journals.¹ At the time the patient was under my care the exact character of the condition was uncertain. An examination of the specimen, made by Dr. W. M. L. Coplin, and Dr. David Bevan, of the Jefferson Medical College, shows the case to be one of those rare cystic growths of the liver originating from the bile ducts. According to the pathologists just mentioned, the case is a duplicate of that reported by Dr. W. W. Keen in the *Boston Medical and Surgical Journal* of April 28, 1892. In that case an elaborate pathological examination was made by Drs. Coplin and Bevan, and also by Dr. W. T. Councilman, of Harvard University. Unfortunately, the imperfect manner in which I kept the specimen before giving it to the pathologists for examination, prevented their demonstrating the presence of coccidia, as they did in the similar case of Dr. Keen a number of months after their original report was printed.²

Dr. Keen had excised an ovoidal tumor, measuring $3\frac{1}{2}$ by $4\frac{1}{2}$ inches, being $1\frac{3}{4}$ inches thick from the anterior edge of the liver. The patient recovered. In my case the whole liver was riddled with very large cysts, which I first thought might be due to echinococcus.

The woman, a German, aged fifty-six years, presented herself for treatment at the Woman's Hospital, October 2, 1893. She had noticed for ten years a growth in the right side of the abdomen. I found there a large mass occupying the greater part of the right hypochondriac and lumbar regions. The tumor was irregular in outline, and presented near the middle line a marked elevation, with the characteristics, on palpation, of a cyst.

On October 20th I made an incision in the median line through the umbilicus, and came upon a large cystic tumor, and discovered that the liver contained many such cysts. I stitched the most prominent cyst to the abdominal wall and waited a week before evacuating it. I then without ether laid open the most prominent cyst and evacuated several ounces of clear fluid.

¹ Annals of Surgery, February, 1894, and elsewhere.

² Medical News.

Into the cyst cavity thus emptied were projecting one or two distended cysts three-quarters of an inch to an inch in diameter. These were punctured and gave exit to limpid fluid. Directly behind the large cyst first opened appeared to be a second cyst. This I punctured with a knife and evacuated several ounces of fluid. I thought I detected with my finger fluctuation of a similar cyst behind the second cavity, though I could scarcely touch the posterior wall of this second cyst with my finger introduced through the first cyst and through the orifice connecting the two cysts. The sense of fluctuation was so similar to that given by the cystic tumors already punctured that I finally thrust a long trocar into the posterior wall of the second cyst. This operation was done, of course, in the dark. Nothing but fluid blood escaped, and it is, therefore, probable that I punctured healthy liver tissue. The oozing continued while I was occupied in other steps of the operation, and was finally controlled, after a number of cysts had been emptied, by scooping out the clots and packing the deep cyst with iodoform gauze. Altogether I must have evacuated the contents of about three large cysts and five or six smaller ones, puncturing them with a knife thrust in various directions through the intervening cavities that had been laid open. The fluid in all of them was limpid. On the left wall of, and within, the first cyst opened was one of the cysts growing inward, already mentioned. When I punctured this with a knife I heard a whistling noise, as though air had escaped from it. No fluid appeared to be in it, and at first I thought I must have opened the intestine. Careful exploration, however, with my finger showed the cyst to be empty and to have no perceptible opening in its wall except that made by the knife and through which I had introduced my finger. It seems impossible to believe that this cyst contained gas only. A careful investigation of its interior with my finger failed to disprove this supposition. I am forced to believe that it was filled with gas, but cannot understand the occurrence. It was so deep that I could make no examination with the eye.

The irregular cavities left by the evacuation of the cysts' contents were thoroughly washed with hot water and the whole space packed with iodoform gauze. A separate piece of gauze was pushed firmly into the deep cyst, which was being filled, as previously detailed, with blood from the wound in the liver behind. The patient showed comparatively little shock during the operation. She was made much more comfortable and could lie flat on her back. The respiration was much less impeded, and no evidences of sepsis or peritonitis occurred. The packing was not removed until the ninth day. A new gauze packing was then adjusted loosely.

The patient seemed to be slowly convalescing, when a large bed sore formed over the sacrum, notwithstanding the fact that she been kept on a water-bed since before the operation. The temperature was somewhat elevated, but not markedly so. On November 11th, three weeks after operation, she died suddenly and unexpectedly.

The liver was found greatly enlarged, weighing $11\frac{1}{2}$ pounds, and over three-fourths of it was riddled throughout by cysts. One large cyst, opened post-mortem in the right lobe of the liver, was found to contain about a pint of yellowish pus-like fluid. The solid portions of the liver resembled the condition called "nutmeg liver." A stone was felt in the neck of the gall-bladder, and the gall-bladder itself was

altered in form as a result of the pressure induced by development of the cysts. The spleen was somewhat enlarged and contained a whitish spot of softened tissue resembling a gummatous tumor. This was incised for examination. Both kidneys were greatly enlarged and riddled with cysts. The uterus and ovaries were found atrophied and non-adherent.

The pleural cavity of the right side was full of serous fluid. The base of the right lung posteriorly was completely consolidated. The left lung showed small areas of consolidation at its base and posteriorly, but was for the most part crepitant. There was no fluid in the pericardial sac.

The heart was pale, very soft and flabby and of normal size. The right ventricle was completely filled by a soft chicken-fat clot. The left ventricle was similarly occupied by a clot which extended into the aorta. The valves were perfect.

I copy a portion of what Dr. Coplin has said in his remarks on the case of Dr. Keen, and append the note saying that this case is identical in its pathological nature.

"Of the cystic adenomata of the liver we know very little, and the confusion is deepened by the fact that the German writers, Ziegler, Klebs, and others, consider cylindrical-celled carcinoma as adenoma, and draw little or no line of differentiation except that of infiltration. The earliest attainable literature is in Klebs, who quotes E. Wagner¹ as having observed in the liver, enlargements, the structure of which resembled the so-called glandular tumors of the mammary gland; Klebs is inclined to think that all adenomata of the liver are malignant, and does not refer to any that at all resemble the present case. Ziegler states that adenoma of the liver may be made up of tubular glands instead of lobules.² Although he lays no stress on these tumors, save in their rarity, he gives a most typical cut presenting the exact histological structure of the present case, and designates the growth as papilliferous cystadenoma. As to the exact origin of these growths, nothing is known. Whether they arise from the ducts or from the liver-cells within the lobules, as Rindfleisch thinks, cannot be demonstrated. The reported cases do not appear at all like the present one; they are solitary cysts disseminated throughout the organ, lined for the most part by pavement epithelium, rarely by cylindrical cells, more rarely by ciliated cells.³ In the latter case one can hardly call it an adenoma or even a cyst."

The pathological report in my case is as follows:

"DEAR SIR: In the report of the histology of the liver we had intended to write anew what we have already said in the case reported by Keen, but think now that we will loan you a reprint of the report. Your case is certainly a duplicate. The faulty hardening has precluded our demonstrating the presence of coccidia, as we afterward did in the case reported by Prof. Keen. Sincerely yours, COPLIN AND BEVAN."

The following instance of mistake in diagnosis is instructive. What was supposed to be an enlarged and displaced liver was shown by oper-

¹ Arch. d. Heilk., 1861, S. 471.

² Path. Anat. and Pathogenesis, Art. 167.

³ Friedreich: Virchow's Archiv.

ative incision and autopsy to be a displaced spleen, which occupied a position on the right side of the abdomen directly below the liver.

Dislocated spleen occupying the right iliac region mistaken for an enlarged and displaced liver; radical operation for umbilical hernia; autopsy. A French woman, aged forty-three years, weighing 208 pounds, applied for treatment at the Woman's Hospital on December 13, 1893. The patient had been a widow for five years, and never bore children. Ten years ago, while lifting a heavy wash-tub of clothes, she felt and heard something give way in her abdomen, and soon afterward recognized the presence of a tumor above the navel, in the median line. This tumor increased in size, and was punctured by a physician nine years ago, under local anæsthesia, and several quarts of fluid withdrawn. An ulcerated condition occurred which lasted for four years. About this time she was told she had Bright's disease.

Examination upon admission showed that she passed thirty-two ounces of urine in the twenty-four hours, and that the secretion contained no albumin and no sugar. The heart and lungs presented nothing special. In the median line involving the umbilicus was a large irreducible hernia, very pendulous, and partly constricted at the base. It was about the size of an adult's head. Percussion over it gave tympanitic resonance. A hard tumor could also be felt within the abdomen, extending from the liver region downward and toward the median line, filling the right iliac fossa, and having its lower edge just above the pubes. This tumor seemed to be connected with the liver, and was looked upon as a possible instance of enlarged and displaced liver.

My colleague, Dr. Frederick P. Henry, saw the case, and, I believe, expressed the opinion that the mass felt in the abdomen was a floating liver. Dr. Anna M. Fullerton, the physician in charge of the hospital, was inclined to a similar opinion. The symptoms of dyspnœa, dyspepsia, sub-sternal pain and other symptoms, interfered so much with her comfort and ability to work that I agreed to do a radical operation for the cure of the umbilical hernia. I thought that the operation would also allow a diagnosis to be made of the intra-abdominal mass and permit us to undertake treatment for that condition if it seemed advisable.

After the patient had been in the hospital a month, under careful treatment and repeated observation, I made an incision three inches in the median line into the hernial sac. About eight ounces of serum were evacuated, and the umbilical ring enlarged by dividing it in a downward direction. The cæcum, the appendix, and a large portion of the great intestine were found in the hernial sac. In addition, I discovered a small cyst-like body the size of a pea, and perfectly translucent, with a long translucent pedicle not thicker than a stout thread, lying among the extruded intestines. This pedicle, which was over a foot long, had an attachment within the abdomen somewhere below the umbilicus. I could not determine its attachment without making more disturbance of the abdominal contents than seemed proper. I drew it out, tied and excised it, and preserved it for examination.

The hernia was so great and the abdomen so filled with the tumor already described, extending downward into the right iliac region, that for a time it seemed impossible to replace the intestine within the abdominal cavity. The patient was put for this purpose in the Trendelenburg position. Some coils of intestine which were strongly adherent to each other were returned unseparated. The colon was so distended

with gas and fecal matter that I finally opened it by a small longitudinal incision and evacuated its contents. The incision was then repaired by a Lembert suture of fine catgut. The evacuation of gas reduced the bulk of extruded intestine so much that I was then able to replace all the intestines within the abdomen.

After I had reduced the hernia I made an exploration of the abdominal cavity to determine the character of the mass below the liver. Dr. Fullerton and I were able to determine that the liver was in its normal position, and that the mass probably was not attached to that organ. We were not able to feel the spleen in the left hypochondrium, and made a diagnosis of probable floating enlarged spleen. The severity of the hernial operation was so great that I determined to make no attempt at treating this solid tumor, and therefore did not prolong the examination to determine with certainty that no spleen was present in the normal situation. The hernial sac was removed, the ring closed by six interrupted sutures of strong silk, and the external portion of the wound closed.

The intra-abdominal tension, of course, was great, but not excessively so, because of the evacuation of gas through the incision made in the colon.

In the evening the woman's pulse was 92; temperature, 100.4°; respiration, 28. During the night the temperature became normal, but rose in the morning to 100.6°. Her respiration increased in frequency, and the next day reached 54 in the morning, at which time her pulse was 110 and her temperature normal. A rectal tube was passed into the bowel to allow the escape of gas. She was given tonics and stimulants, but died suddenly, about twentyfive hours after operation, with intense dyspnoea.

The autopsy showed the following conditions:

Opening the wound and carrying a median incision downward displayed an enormously distended stomach. The stomach seemed dilated. I am not certain whether this was true dilatation or simply an apparent dilatation, because of the great distention; but I am inclined to believe that the stomach was larger than normal. From the cardiac end of the stomach the gastro splenic omentum extended downward and to the right, being about six inches in length, twisted, and much thickened. In some places it was two inches in diameter. Attached to it and lying in the right lumbar and iliac regions was a greatly enlarged spleen. The spleen measured ten inches in length, five inches in width, three inches in thickness, and weighed about four pounds. It was adherent to the sigmoid flexure, which had a long meso-sigmoid. The wound of the large bowel, which had been intentionally opened during the operation, was in an aseptic condition and covered with lymph. Lymph was deposited on some of the intestines, which had been contained in the hernial sac, and the adhesions of which had been separated during the operation. There were no signs of septic peritonitis. Attached to the spleen were several filaments or long shreds, somewhat similar to the curious structure removed at the time of operation. It is probable, however, that the strands attached to the spleen were stretched deposits of lymph. That removed at the operation was certainly not lymph. The surface of the spleen was roughened somewhat, but section of the organ showed nothing special macroscopically except hypertrophy.

The lungs were crepitant, and apparently normal, except that some

adhesions existed above and posteriorly upon the right side of the chest.

The uterus contained some fibroid masses and granulations on its posterior wall. A cyst existed in connection with the left broad ligament and ovary. Some granulations were seen distributed over the broad ligaments and ovaries.

The liver was normal in color and seemed uninvolved by any pathological process. The gall-bladder was seven inches in length, and contained 325 small stones. The kidneys to macroscopical examination were normal.

Some serous fluid was found in the pericardium. The heart was full of blood and in a condition of diastole. The tricuspid valve was opaque, but otherwise normal. The mitral valve was similarly opaque and thickened. All the valves appeared to be competent.

Death in this case occurred, it seems to be, from great distention of the stomach preventing the descent of the diaphragm. If we had known the exact condition of affairs, it is possible that passing an œsophageal tube to evacuate the stomach, or aspiration of the stomach through the anterior abdominal wall, would have averted the fatal issue. The fact that the distended stomach was to a certain extent confined behind the lower ribs and their cartilages obscured somewhat the cause of the woman's dyspœa. Passage of the rectal tube and the administration of hot drinks to aid in the eructation of gas were remedies adopted by the hospital physicians to reduce the abdominal tension. Death occurred suddenly, as if the diaphragm were interfered with excessively at the time. It seems to me probable that the traction on the stomach by the heavy spleen lying on the opposite side of the abdomen, distant from its normal situation, may have twisted the stomach in such a way as to interfere with the escape of gas from the stomach into œsophagus or duodenum.

The next case is one in which an infiltrating tumor of the liver was mistaken by me for a non-malignant growth of the omentum. The pathological nature of the tumor is not known, though exploratory incision proved it to be a hepatic growth. It is possible that it is of syphilitic origin. The patient is now recovering from the section, as will be seen by the following history :

Infiltrating tumor of the right lobe of the liver, causing an elongated process extending below the level of the umbilicus. A married woman, aged twenty-eight years, was admitted for treatment at the Woman's Hospital on January 26, 1894.

Her previous history is not important, except that some time after her marriage, which occurred about eight years previously, a sore appeared on the lower lip. The lip became greatly swollen ; and what she calls the "blister" was hard at its base, and covered with a crust. This condition lasted for five months before cure. A physician told her that she had poisoned herself. An eruption occurred shortly after the appearance of the labial sore, and was most marked on the left knee

and hand. She states that the sore on her knee did not heal for ten months. Her husband is known to have had a chancre and constitutional symptoms about this time.

Soon after marriage she had one miscarriage, and then bore two healthy children, who are still living.

Ten months ago she observed a small, hard mass above and to the right of the navel; this has rapidly increased in size. The growth was quite painful, but the pain was much relieved, she says, by the application of electricity, administered by Dr. A. H. P. Leuf. On admission the patient had normal pulse, temperature and respiration, and nothing abnormal was found in the heart, lungs, or urine. She was greatly emaciated. There was a white irregular cicatrix in the mucous membrane of the lower lip, and another on the anterior surface of the left knee.

A large flattened mass, two inches and a half by five inches and a half, could be felt in the right side of the abdomen. The mass extended from the right hypochondriac region downward, occupying portions of the epigastric, umbilical, and lumbar regions, its lower border being two inches below the level of the umbilicus. The mass was quite movable, seemed to be loosely attached posteriorly, and presented a convex edge toward the middle line of the body. The examiner's fingers could grasp the edge of the tumor, which seemed to be about an inch thick. A slight irregularity, almost like the hilum of the spleen, could be felt. The tumor extended upward in the direction of the diaphragm and liver, and its edge could be traced to the neighborhood of the ensiform cartilage. Over a circumscribed portion of the tumor there was tenderness on deep pressure, although this was not very marked. Its surface was for the most part smooth, but the thin abdominal wall permitted a slight depression and irregularity to be felt at the point of tenderness. The tumor moved with respiratory efforts.

Because of the clear specific history of the patient, she was given a fifth of a grain of green iodide of mercury before meals, and thirty grains of potassium iodide after meals. The specific treatment was continued for nearly a month, the dose of potassium iodide being diminished and the mercury stopped, as her gums became tender. Her general condition improved, but the tumor did not appear to diminish in size.

The diagnosis of probable gummy tumor of the liver, which I had made when I first saw the case, seemed to me incorrect, as no apparent diminution in the growth occurred, though she was subjected to pretty active medication. Accordingly, after nearly a month's treatment, I advised exploratory abdominal incision. I expected to find a non-malignant tumor of the omentum, for it seemed to me that the growth was not connected with the liver. An incision in the median line allowed me to introduce my finger for exploration. The tumor was found to be an infiltration of the left portion of the right lobe of the liver. The liver was prolonged, as it were, in a great tongue, which reached almost to the crest of the ilium. The abnormal portion was hard, of a mottled grayish appearance. It gave no evidence of being cystic, and was rather granular upon the surface, though there were no actual elevations, such as might be called granulations. The tumor above had a moderately distinct margin, separating it from the healthy liver structure, though this was not as definite as it would have been in a distinctly encysted or localized tumor. The gall-bladder was situated far

down in the right lumbar region, being displaced by the abnormal growth of the overlying portion of the right lobe of the liver. No abnormality in the gall-bladder was noticed.

The facts that the patient had little pain with this growth, that her general health was good, and that a specific history existed, impelled me to make no attempt to remove the disease. Such a procedure would have required an extensive and bloody operation, done with safety only with the actual-cautery knife. It would have been almost impossible to have removed the abnormal tissue without excising the gall-bladder, although it is possible that the gall-bladder might have been peeled away from the overlying tumor. Operation would really have been a resection of a large portion of the right hepatic lobe.

It is a little difficult to say whether the condition is more properly described as an infiltrating tumor of the liver or localized infiltration and hypertrophy of the liver. The wound was closed by means of a continuous catgut suture for the peritoneum, and interrupted silk sutures for the muscular and cutaneous structures. Her convalescence has been uninterrupted, except for some suppuration in the abdominal wall, due probably to an unobserved defect in asepsis. It is now two weeks since operation. I shall, after convalescence from the operation, push with vigor the anti-syphilitic treatment, which has already been renewed in connection with iron.

The patient was subsequently discharged, with the request to report occasionally at the hospital. A note made by one of the clinic physicians three months after the operation states that the tumor was greatly reduced in size. The growth was therefore probably syphilitic.

Single tumor of the liver, in which removal was attempted. The case just described differs from the hepatic tumor which I attempted to remove, that was reported to the Philadelphia County Medical Society, by me, on September 28, 1892. In that case I had found in the right lobe of the liver a single flattened tumor, irregular in outline and about three inches in diameter. It was about an inch and a half thick, and occupied the anterior portion of the right lobe of the liver, directly over the gall-bladder, and involved the edge of the liver, which was thickened by it. There were no adhesions between the tumor and other abdominal contents, and it had a distinct outline where it came in contact with the healthy liver tissue. The surface of the growth was of a dirty brownish-white color, and showed irregular puckering of its peritoneal investment, as though the peritoneum was thickened by chronic interstitial inflammation. Although I believed the tumor to be a malignant one, I considered it a proper case for excision, because there was no other growth discovered in the liver, and no infiltration beyond the distinctly marked borders of the tumor. I began the operation by attempting to separate the gall-bladder from the under surface of the tumor by the thermo-cautery knife. Before I had accomplished this step, quite free hemorrhage occurred from a vein the size of a goose-quill, which was opened by the cautery. At this moment one of the rubber bulbs of the thermo-cautery burst, and as I had no other instrument with me I was obliged to abandon the operation. The patient passed out of my hands after healing of the abdominal incision, and died three months and a half later. Her physician, who unfortunately made no autopsy, wrote me that before death the patient's skin became decidedly yellow, that the tumor, which was very evident through the

abdominal wall, had increased in size, and that two or three small tumors were discovered on the back and neck. The patient died from exhaustion. This history would seem to show that my diagnosis of malignancy was correct.

The following case of tumor of the liver, apparently a gumma, is still under treatment. Specific treatment has greatly diminished the bulk of the tumor, and the patient is almost cured.

Hepatic tumor of syphilitic origin improving rapidly under treatment.

A married woman, aged forty-eight years, became an out-patient at the Woman's Hospital in November, 1893. She complained of a sense of constriction in the epigastric region, and suffered somewhat from nausea. Palpation of the abdomen showed the presence of a tumor somewhat nodular in character, lying in the middle line between the right and left costal margins and about an inch below the ensiform cartilage. The mass was about the size of a woman's fist, hard, and seemed to be connected with the liver. A diagnosis of tumor of the liver, probably malignant, was made. The patient stated that during last summer she had some diseased bone removed from the back, near the lower angle of the right scapula; at this point a scar was visible. Neuralgic pains developed after the operation, in the back and right arm. She had not full motion of the arm at the shoulder.

Believing that the case was possibly one of syphilitic disease, I gave her a fifth of a grain of green iodide of mercury before meals, and twenty grains of potassium iodide after meals. The symptoms immediately began to ameliorate, and the tumor promptly diminished in size. In one month's time the patient felt quite sure, as did I, that marked diminution in the bulk of the tumor had occurred. In January the potassium iodide was increased to thirty grains, three times a day, whereas the green iodide of mercury was continued in the rather small dose of one-fifth of a grain three times a day. The mercury was not pushed more vigorously because the patient was a dispensary case and reported only once a week. I was a little afraid that salivation might occur during the week, and do harm before the patient reported.

In February I increased the green iodide to a third of a grain, giving a little tannic acid with each pill, as I usually do. Up to this time no salivation had occurred. Once or twice the treatment was suspended for a few days, because of the fear of salivation.

I saw this patient a week ago, when the tumor could be felt as a small nodule, scarcely larger than a walnut. Her general health is much improved, and her arm, which had previously been somewhat stiff at the shoulder, is more movable. The diagnosis of syphilitic gumma has, therefore, been confirmed by treatment, and the patient will doubtless completely recover.

Several months' observation confirmed this statement.

The last of this group of patients treated at the Woman's Hospital gave very little opportunity for diagnosis, because she was admitted in an almost dying condition, and the indication to open a large abscess coming from within the abdomen was so urgent that no attempt at a careful diagnosis was made. The existence of a large perforation between

the stomach and the gall-bladder, which was the seat of a colloid tumor, makes it remarkable that life should have been prolonged as it was.

Colloid tumor of the gall-bladder with perforation of the stomach, abscess and general peritonitis. A German woman, aged seventy-four years, was admitted on September 22, 1893, with the history of having been in poor health for six or seven years. Four years previous to her admission she had experienced pain in the region of the liver, which was followed two years later by a chronic cough, which still exists. About a year previous she had observed a hard lump in the region of the liver, and she became the subject of diarrhœa. The connection of the diarrhœa with the hepatic disease is not established. About a week before admission a swelling became very noticeable to the right of the umbilicus, and was accompanied by severe pain. The patient suffered greatly with dyspnœa, slept poorly, and was unable to eat. In addition to the diarrhœa mentioned above, she had had vomiting at intervals for about two years.

Physical examination showed the heart's action to be irregular and feeble. There was dulness on percussion over the infra-clavicular region of the right side. Expiration was high-pitched and prolonged over the left lung. The patient's breath was exceedingly offensive and somewhat sweetish in odor. The abdomen was greatly distended, and a mass was found within the abdomen, extending from the margin of the ribs to below the level of the anterior superior spinous process of the ilium on the right side. There was bulging in the right flank, with resistance on palpation. There was a small area of tympany at the border of the ribs on the right side. The abdominal wall over the mass was reddened, and showed fluctuation and pointing as of an abscess. The parts were tender to the touch. The patient's condition was so critical that it was doubtful whether she would stand ether, but it seemed to me important to at once open the abdominal abscess. After cleansing the skin, an incision was made in the fluctuating mass, and a large quantity of very foul pus and gas evacuated. The operation was done hastily, with the patient in the semi-erect posture, without general anæsthesia. The cavity was washed out with sublimate solution, 1:5000, an antiseptic dressing applied, and the patient put to bed. Strychnia and quinia were given. The bowels were moved during the afternoon, the passages being offensive, of light color, thin, and watery. The dyspnœa was improved by the operation, but the condition of the patient continued very critical. She frequently vomited, and the evacuations of the bowels had the character of diarrhœa, and were tinged with blood. Stimulants and tonics were unavailing, and she died two days after operation.

An autopsy was made and disclosed the fact that the abscess cavity which I had incised had no direct connection with the general peritoneal cavity. An incision made in the median line from the ensiform cartilage to the symphysis of the pubes opened the abdominal cavity and disclosed the fact that the omentum and intestines were adherent to the abdominal parietes upon the right side. It was evidently this plastic peritonitis which had walled in the abscess cavity. Many adhesions existed between the various abdominal viscera. The stomach was greatly dilated, and was displaced downward by adhesions to a tumor the size of an infant's head, apparently developed from the gall-bladder. The omentum and intestines were firmly adherent to this tumor, which was

found on subsequent examination to be the gall-bladder greatly enlarged and altered by a colloid growth. An opening large enough to admit three fingers existed between the greatly enlarged gall-bladder and the stomach. The opening entered the stomach near its pyloric extremity. The liver was enlarged, had undergone fatty degeneration, and was adherent by its entire anterior surface to the abdominal wall. The spleen was enlarged and softened. The peritoneum was dry and opaque, and its parietal and visceral layers adherent to each other in many places. There was no fluid in the peritoneal cavity. The pelvic viscera appeared to be normal. The lungs were collapsed and softened, with the lobes adherent to each other. The right apex was consolidated. Adhesions of the pleura were present, and the mediastinum was full of calcareous masses of dark color, which appeared to be altered mediastinal glands. The heart had a hypertrophied left ventricle, and showed dilatation of the right ventricle. The kidneys seemed normal.

Gummy tumors of the liver, in which over thirteen grains of green iodide of mercury were taken every day with benefit. During last spring I treated at the Methodist Hospital a patient with syphilitic tumors of the liver, which is interesting to record in connection with these cases.

The man, who was aged twenty-five years, had contracted syphilis two years previously. He had been sick a number of months before I saw him. He was much emaciated and had an exceedingly large liver, upon which was one especially prominent protuberance in the epigastrium. This growth was hard, not tender, and the seat of little or no pain. The patient, however, had become accustomed to the use of morphia for sleeplessness and pain in the back. The bulky liver, which extended down to the navel, made so much pressure upon the aorta that its pulsations were transmitted to it. The patient's heart, lungs, and urine showed nothing abnormal.

He came under my care, through the courtesy of Dr. H. C. Paist, in April, and was at once put upon potassium iodide, gr. x.; corrosive sublimate, gr. $\frac{1}{24}$, three times a day. The potassium iodide was increased, until at the end of April he was taking fifty grains three times a day, and corrosive sublimate, gr. $\frac{1}{2}$, three times a day. These drugs were varied in amount in accordance with the condition of the patient's stomach, which even before he began such active treatment was somewhat irritable, the result, perhaps, of the pressure upon the stomach exerted by the enormous gummatous liver. This organ I believed to be the seat of numerous gummy growths.

About the 1st of May mercurial inunctions were begun night and morning, and the green iodide of mercury, gr. $\frac{1}{4}$ four times a day, substituted for the corrosive sublimate. Later the mercurial inunctions were increased to four times a day, and a quarter of a grain of the green iodide of mercury given six times a day. A short time later I stopped entirely the potassium iodide, which he had been taking from April 23d to May 16th, in doses of forty to sixty grains three times a day, separated from the nearest dose of the mercurial salt by a meal, so that no possible chemical reaction should take place between them.

The potassium iodide seemed to irritate his stomach more than the green iodide of mercury. It was, therefore, stopped on May 16th, and I decided to push the mercury, both by inunction and by the stomach. He was also given milk punch, strychnine, and quinine. By the 21st of May he had, by gradual stages, reached the dose of a grain and a half

of the green iodide of mercury every two hours during night and day ; for it seemed to me that unless we could rapidly diminish the size of the liver he was destined to perish. The inunctions with ointment of mercury were continued with the medication by the mouth. Tannic acid was given to prevent purging. A marked decrease in the bulk of the organ and in the prominence of the chief tumor took place during this active specific treatment. The diminution of the most prominent tumor was particularly evident. This was very gratifying to me, because the progressive emaciation of the man permitted better exploration by palpation of the growth. That it should be evidently smaller to my touch, though the belly wall over it was thinner, showed me that the decrease in size was very great. He had, however, recently become jaundiced, and though not confined to bed, or even to the house, was very weak. There was no special rise of temperature, but the dyspeptic symptoms, of which he had always complained, persisted to a certain extent. He died on June 16th, after having developed, subsequently to the occurrence of jaundice, marked ascites. For this condition he was aspirated, by one of my colleagues then on duty in the ward, in the middle of June, and a gallon and a half of fluid removed from the peritoneal cavity.

At the time of death, the tumor, according to the resident physician's notes, had diminished so much that there was a space of three inches between its lower edge and the upper margin of the navel. At the time of his admission the same notes show that it extended to that point. There was, during this time, a corresponding diminution of the general bulk of the liver, which upon his admission was enormous.

The case was interesting to me because of the great amount of iodide of potassium he took without coryza, and the astonishingly large doses of green iodide of mercury administered without causing salivation. Some of the night doses were omitted when he was asleep, but he received over thirteen grains of the iodide of mercury during the twenty-four hours, with benefit, and no special discomfort. The amount of mercury absorbed by the skin from the inunction is unknown. After taking this large quantity for six days, the same dose—namely, a grain and a half—was given every four hours for twelve days. The records kept at the latter part of his illness do not give a very definite account of the case, but it appears as if the anti-syphilitic treatment were discontinued for about one week before his death. I, myself, had not charge of the case after the end of May. The jaundice and dropsy were evidently due to pressure on the bile vessels and portal venous system, possibly the result of a cicatrizing sclerosis.

MEGALO-CEPHALIE, OR LEONTIASIS OSSEA.

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WITHIN the past few years attention has been drawn to various disturbances of nutrition occurring in the human body, either limited to certain parts or affecting the entire organism. We are at present familiar with changes in the growth and size of single parts or segments of the limbs, such as are seen in the various forms of atrophy and hypertrophy of muscles or of the skin, and also with changes in the appearance and size of the hands and feet, such as appear in acromegaly. Disturbances of nutrition of a more diffuse kind, attended by changes in the size and appearance of many tissues, are known to occur in myxœdema; and in fact, it is the study of this latter disease that has thrown much light upon the nature and origin of all disturbances of growth and nutrition. The fact that the secretion of the thyroid gland, when absorbed into blood, has a direct influence upon the nutrition of the hair, the skin, the subcutaneous tissues, the muscles, and many of the internal organs, cannot be denied. And there are many facts which show that an excess of thyroid activity is just as detrimental to the human organism as an arrest of its functions, for it seems quite apparent that in certain of the cases of Graves' disease some of the symptoms of malnutrition are to be ascribed to an increase in thyroid activity. The facts ascertained regarding myxœdema and its dependence upon the thyroid gland lend a certain amount of probability to the statement that acromegaly is dependent upon disease of the pituitary body, although this is not fully proven. We do know that the progressive growth in size in the hands, feet, and bones of the face, is often found associated with a hypertrophy of the pituitary body. Again, it is probable that all the symptoms of Addison's disease are definitely to be assigned to disease of the adrenal bodies. We are warranted in the surmise, in view of these facts, that there are certain diseases of nutrition which are dependent upon lesions in various glandular organs, whose function has been hitherto obscure, which deserve further study.

There has lately come under my observation, in association with Dr. G. K. Dickinson, of Jersey City, a case of a peculiar character, which, so far as I know, has not as yet been described, of a trophic disease quite analogous to acromegaly, the chief symptom of which is a gradual or progressive enlargement of the head and neck, and which I venture to name megal-cephalie.

The patient is a woman, aged fifty-two years, American by birth, and of healthy parentage, her mother being still alive at the age of seventy-

eight. She has one brother and two sisters living and healthy; the family history is free from all evidence of cachexia or neurotic habit;

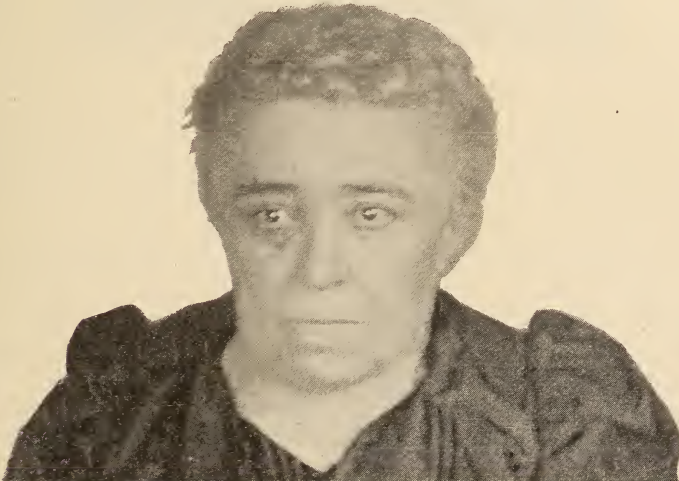
FIG 1.



Condition in 1889, before enlargement of head and neck began.

she has been married since the age of twenty-one, but has had no children; she has been in excellent health until the beginning of this disease—six

FIG. 2.



Present condition, 1894, showing uniform enlargement of the head.

years ago. The first symptoms noticed were formication felt in the tips of the fingers, particularly of the right hand, which gradually extended

upward to the shoulder; this numbness was associated with a slight clumsiness of movement and uncertainty in tactile perception, although there has never been and is not now any actual anæsthesia, either of touch, temperature, or of pain, and the muscular sense is normal. She has never felt any of this numbness in the legs or body, but she has noticed for the past five years a disturbance in the gait, consisting of an uncertainty in movement and a subjective feeling of weakness. During all this time there has been a slowly progressive enlargement of the head and neck, and at the same time a gradual diminution in stature. Five years ago she was five feet seven inches in height, now she is five feet

FIG. 3.



Present condition, 1894, showing enlargement of the neck and head.

two; this shortening is partly due to a stooping posture resembling that assumed in *paralysis agitans*, partly due to an apparent sinking of the head and neck between the shoulders, which causes a very peculiar appearance.

The striking feature of this disease and its chief characteristic, as shown in our patient, for whose history I am indebted to Dr. Dickinson, is a slowly progressing increase in the size of the head, face, and neck, both the hard and soft tissues being apparently affected. The skin is diffusely thickened to a slight extent, is thrown into folds and not merely stretched over the enlarged bones, as it would be were it not involved in the process; and while it is not rough or scaly, is slightly pigmented and has something the appearance of the skin in *myxœdema*. The subcutaneous tissue is also diffusely thickened, so that it throws the skin out and forms a loose body beneath it. The bone appears to be the portion primarily and chiefly affected, just as in *acromegaly*. There is apparently a general hypertrophy of the bone over the entire calvarium,

more marked just behind the temples. This is not limited to definite small areas, but is quite uniform everywhere, so that the skull is enlarged uniformly. The head measures twenty-four inches in circumference about the forehead, fifteen inches from ear to ear over the vertex, and sixteen inches from the root of the nose to the occipital protuberance. Even the vertebræ of the cervical region appear to take part in the enlargement, and as a result the head is less movable upon the spine than it should be, and the spines of the vertebræ from the fourth to the seventh are decidedly prominent in the neck. A feeling of weight in the head is quite intense and had led to the hair being cut short, and it was noticed that the hair had become quite thin, especially at the sides, when formerly it had been thick and heavy. This diffuse growth of the head and neck is quite well shown in the photographs, which are all the more instructive, as the contrast between the woman in her ordinary state of previous health five years ago and in her present condition is shown. The thickening of the facial tissues tends to decrease the natural mobility of the face, so that the facial expression is more fixed than in a state of health. The thickening seems to have encroached upon the cavities of the nose and mouth, there being some obstruction to breathing and swallowing without thickening of the tongue. There is a hard respiratory sound in the trachea constantly in breathing, and this has been present for a year past.

The general symptoms which this patient suffers from are gradually increasing mental irritability and general nervousness, without any mental or emotional defect; an increasing disability to walk and to use her hands, attended by much numbness, especially in the hands, an occasional pain in the neck, arms, and hands; some awkwardness of movement in the fingers, but no marked ataxia, for she can knit, can thread a needle and do fancy work. There is no anæsthesia present, and there is no loss of pain or thermal sense. The act of walking is performed with difficulty and is now only possible with the aid of holding a chair, though there is no ataxia of movement and no spastic rigidity of the legs; the knee-jerks are slightly increased, but there is no clonus; the control of the sphincters is perfect. In walking she has a general sense of insecurity and feebleness, but there is no evidence of paralysis. She stoops forward much like a patient suffering from paralysis agitans, but has no tendency to fall or to festination. She is able to walk up and down stairs with help. Her neck is sixteen inches in circumference—at least four inches larger than formerly. There are two soft non-fluctuating swellings below the ears having the feel of diffuse, fatty infiltrations, and the neck is uniformly increased in size. There is no apparent swelling of the thyroid gland. The cervical vertebræ feel thick and are unduly prominent, but are not tender. She has had considerable pain along the course of the occipital nerves; in other

respects her general health is very good, the digestive and urinary functions being perfect. The heart is regular, is not enlarged, and the pulse tension is normal. There are no cardiac murmurs, but a blowing murmur is heard over the arch of the aorta synchronous with the first sound. There is no area of dulness, and there are no other symptoms to suggest aneurism. No cause is to be found for this condition, which has advanced so gradually that its actual date of onset is difficult to determine, though she is certain that it began more than five years ago.

The very extraordinary appearance of the head in this patient suggested to me that she might be suffering from a condition known as leontiasis; but a careful study of the literature regarding leontiasis convinced me that under this name a number of entirely different conditions have been grouped.

The term leontiasis has been applied to a form of leprosy affecting the face, and very clearly described by Leloir in his monograph upon lepra, where several plates illustrating the appearance of the face in this disease are to be found. In this condition there occurs a deposit of new material here and there upon the face beneath the skin, and these deposits gradually enlarge and coalesce until the entire face is changed into a hard mass with deep seams and roughened surface, the features being almost obliterated and the eyes sometimes closed. The bones of the face are not usually involved, and the disease does not extend upward beyond the line of the hair, and does not produce any enlargement of the cranial bones. The term leontiasis has been applied to this because the rough, seamed, and thickened appearance about the mouth suggests the idea of the jaw of a lion. It is said that the term has been in use since the time of Galen.

There is a second condition to which the term leontiasis has been applied—namely, a condition of elephantiasis affecting the tissues of the head and neck. This is mentioned by Virchow in his work upon tumors. He describes it as a diffuse thickening of the soft parts of the head and face, consisting of an increase in fibrous tissue, and considers it a form of fibroma molluscum. This form corresponds in its history to elephantiasis; it begins quite suddenly with an acute condition, which may be either erysipelas or dermatitis or phlebitis; the skin becomes swollen and red simultaneously, and there is often an eruption of vesicles after the acute symptoms subside, but the swelling does not disappear entirely, and the skin pits upon pressure. Later, there is a recurrence of the acute condition and an increased swelling; and so the disease goes on with acute exacerbations and remissions; ulceration of the surface and very deep pigmentation are commonly observed in the parts affected. After describing this condition and recording a clinical case described by Gruber, Virchow says: "I do not wish to affirm that

there is not a form of leprosy which calls to mind the appearance of leontiasis; on the contrary, I have often seen such a form of leprosy in Norway, but the greatest deformity occurring ordinarily without ulceration is the peculiar characteristic of fibroma molluscum, or elephantiasis molluscum."¹

I think it is quite evident that the disease from which our patient is suffering does not in any way correspond to either of these two diseases to which the term leontiasis had been applied.

There is a third disease to which Virchow gives the name bony leontiasis (*leontiasis ossea*), which, however, resembles megaloccephalie more closely. In his description of tumors of a bony nature, after describing exostosis and periosteal thickenings, Virchow devotes a section to hyperostosis of the face and head. This may take two forms: first, a diffuse hyperostosis of the cranium; secondly, localized hyperostosis upon the maxillary bones. This latter condition we may dismiss without further consideration, inasmuch as it presents no points of a resemblance to our own case. It has been studied carefully by Le Dentu in *La Revue mensuelle de Médecine et de Chirurgie*, 1879. The diffuse hyperostosis of the cranium is, according to Virchow, symmetrical and uniform, so that it does not present any bony excrescences and suggests the idea of tumor. Virchow's description is based upon the examination of certain skulls, which are preserved in various museums, the first one having been described by Malpighi, 1697. There are about six of these skulls known in Europe, all of them presenting tremendous enlargement of the bones of the head of a diffuse character. Virchow says: "This condition is for the skeleton what leontiasis is for the soft parts; the appearance of these pathological specimens, seen a certain distance, produces the effect of leontiasis modelled in plaster. Hence, I have the less hesitation in giving the name of bony leontiasis, since, as I believe, the disease corresponds exactly with that which we call elephantiasis in the soft parts. Ordinarily, the hyperostosis is associated with a fibrous change in the soft parts; in the rare cases which we have seen, it is the periosteum which is the principal seat of the disease. Unfortunately, we have no records of clinical observations, and no knowledge of the exact conditions present by recent autopsy."²

In a monograph upon *leontiasis ossea*,³ Baumgarten has made a careful study of this condition described by Virchow, and has collected the descriptions of all these skulls in the various museums of Europe. He has shown that some of these skulls present a uniform thickening of all the bones, while others have shown an enlargement limited to the

¹ Virchow: *Pathol. des Tumeurs*, vol. i. p. 324.

² Virchow: *loc. cit.*, vol. ii. p. 22.

³ *La Leontiasis Ossea*, par Dr. F. Baumgarten, Paris. Steinheil, 1892.

bones of the face, the cranium escaping. He points out the fact that the latter class of skulls probably belonged to patients suffering from the disease acromegalia, in which, as is well known, the bones of the face are very markedly enlarged. It is evident from Baumgarten's study that the term *leontiasis ossea* must be limited to the cases in which the hyperostosis of bone has affected the bones of the cranium only, or these, together with the bones of the face. He considers that the pathological changes present are either a thickening of the surface of the bone alone, or a change both in the surface and the diploe; the latter being in some cases transformed into a spongy tissue; in others, into a hard tissue like ivory. He admits that the literature does not contain any description of this disease observed during life, and he does not think that cases have been observed.

It is my opinion that the case here described is this disease, and that we can affirm that in these cases there is not only a hypertrophy of the bony tissue, but also of the soft parts about it. It is probable that the diffuse thickening of the bones of the head and neck causes some pressure upon the contents of the skull and upon the nerves at their exits between the vertebræ. This might explain the symptoms which are present in our patient—especially the complaints of numbness and the difficulty in her gait.

Various forms of treatment have been pursued in the case under consideration. A thorough trial of thyroid extract failed to affect the condition in any way, and did not cause any variation in temperature from normal. The use of arsenic and strychnine, given in moderate doses, appears to have had some tonic effect, and these, together with the moderate use of corrosive sublimate internally, are the remedies relied upon.

I have ventured to give the condition the name *megalo-cephalie*, because, as already shown, the term *leontiasis* has been applied to three entirely distinct conditions, and therefore leads to confusion.

REVIEWS.

SYPHILIS IN THE INNOCENT. Clinically and Historically Considered; with a Plan for the Legal Control of the Disease. By L. DUNCAN BULKLEY, A.M., M.D. New York: Bailey & Fairchild, 1894.

THIS work, to which was awarded the Alvarenga prize by the College of Physicians of Philadelphia for the best memoir on any medical subject, takes up, as its name would imply, syphilis as a non-venereal disease. For the first time the subject of syphilis innocently acquired has been thoroughly studied, and the results of this investigation are perhaps as astonishing to the professional man as to the lay reader. Although the title accurately interpreted would include hereditary syphilis and that conveyed in married life, Bulkley wisely limited himself to the disease as it is acquired by means other than the sexual act. In his text there is given a table of 9000 extra-genital chancres and also a table outlining over 100 epidemics which have occurred in the last three hundred years. The first two chapters of the work deal with general topics, such as the antiquity of syphilis, its geographical distribution, its forms. The third chapter takes up the subject-matter of the present work, namely *syphilis insontium sine coitu*. An elaborate classification of the modes of infection is given, describing more than one hundred means of transmission, grouped under the general headings: (1) in connection with household and industrial life; (2) in the care of children; (3) in professional pursuits.

In the table of 9058 extra-genital chancres, excluding those due to vaccination, the largest number were observed on the lips, next in order of frequency chancres were found on the breast and nipple, the buccal cavity, the fingers and hands, the eyelids, the conjunctiva and tonsils.

In the fourth chapter there is given a report of 113 personally observed cases of extra-genital chancre. Then follow sections on pandemic and sporadic syphilis, with tables of pandemics.

The diagrams illustrating the spread of syphilis from one person, as by vaccination or nursing, are peculiarly suggestive. The tenth and last chapter of the book proper deals with prophylaxis, hygiene, and medico-legal considerations, and a plan for the legal control of syphilis. In regard to the last point Bulkley holds that prophylaxis of the disease by no means relates entirely to its venereal aspect, and the public health must be protected against the malady which affects the innocent and guilty alike, and which may come when danger is least suspected. The aim of legal control should be the prevention of an unnecessary extension of the disease which produces misery and death among both guilty and innocent. Syphilis should be placed in the same category as smallpox, scarlatina, and other contagious diseases, since it counts its victims by thousands where those of other diseases are counted by

hundreds. Its effects on the community are far more disastrous than those of smallpox, hence it should be placed under the control of health authorities.

Tarnowsky's case is quoted as showing how much damage may be done by a single syphilitic woman, this observer stating that one case of his contaminated no less than three hundred men within a period of ten months, this representing merely the primary transmission.

The first step in the right direction would be the placing of syphilitic cases under the jurisdiction of health officers. Moreover there should be a system of sanitary inspection and control preventing the importation of the disease from abroad. The popular recognition of the contagious and virulent qualities of the disease would insure the passage of proper laws relating to the subject.

The author holds that it should be considered as criminal to communicate syphilis wittingly as it is to transmit smallpox or diphtheria. This would insure the healthy condition of prostitutes from self-interest, and might ultimately result in a forced examination of the men who visit these places. Furthermore, it would prevent clandestine prostitution, since general knowledge of the subject would warn people of the fact that street-walkers are most likely to be diseased.

The book closes with an appendix on the literature relating to syphilis of the innocent, arranged in accordance with the classification of modes of infection, and with an analytical bibliography of the disease, both singularly accurate and copious.

This work is much more than an able and laborious collection of statistics. It teaches a lesson so plain that no technical knowledge is needed to understand it. It should be read by every intelligent man and woman in this country. In the hands of the moral reformers, the strivers after a social purity, it would be a weapon more powerful than any with which they have ever yet been armed. Should the community once thoroughly understand that there is in their midst a disease more prevalent than smallpox, even in times of the worst epidemics, one which in its most virulent stage may show no sign to the layman, one which is highly contagious, one so loathsome in its association that the public mention of it is an indecency, one which often cripples and destroys two generations, and one to which the most innocent are exposed, proper legislation aided by personal fear would accomplish a reform which under present conditions is absolutely hopeless.

E. M.

LA MEDICATION PAR L'EXERCISE. Par le DR. FERNAND LAGRANGE, Lauréat de l'Institut et de l'Académie de Médecine; Médecin Consultant à Vichy. Pp. xv., 576. Paris: Félix Alcan, 1894.

[THE THERAPEUTICS OF EXERCISE.]

IN reading this substantial volume one cannot but be impressed by the progress toward a scientific foundation which the subjects discussed in this work have made. In the first part, of 148 pages, the therapeutic effects of exercise are fully set forth. Defining exercise as the entrance into function of organs, whatever they may be, and considering the exercise of the muscles especially, it is readily determined that by muscular

movements the normal development of the body can be aided, and it can be kept in a healthy condition. It is also shown that by means of muscular activity all the organs of the body are influenced to a greater or less degree. The therapeutic effects of active exercise are summed up: 1. Local, increase in size and power of muscle. 2. Neighboring, on the circulation, on adjacent or subjacent organs. 3. Indirect, muscular acts accessory to the principal one. 4. General: (*a*) physical, elevation of temperature; (*b*) physiological, increase of organic functional activity; (*c*) chemical, increased oxygenation. Of passive exercise it can be said to have mechanical, physiological, and chemical effects, by no means limited to the parts operated upon. The study of fatigue, training, education of the motor and organic functions, the indication for exercise based upon the pathogeny of diseases, whether mechanical, physiological, or chemical, all receive attention. The contra-indications of exercise—fatigue, febrile conditions, hemorrhage, inflammation, and pain—are presented from a conservative standpoint, starting from the proposition that exercise is favorably indicated in all cases where it does not injure. One hundred and twenty pages are devoted to the means of exercise. The choice of exercise, whether methodical or as some form of sport, and the bearing of the end which is desired as a factor in determining this choice, leads to a complete exposition of the various means in use. We do not recall that we have ever met with a clearer description of the Swedish system as created by Ling and modified by his numerous pupils, nor has the social and professional *status* of its teachers at the Central Institute at Stockholm ever been so fully explained. After reading this chapter, the peculiar combination of the teaching of military gymnastics and medical manipulations appears to have reason for its existence; and from this standpoint it is not illogical that a major in the Swedish army should acquire celebrity for his treatment of diseases of women by massage. Mechanical gymnastics vary according to the varieties of machines, those which actively exercise the muscles, and those which impress various movements upon the body which it passively undergoes, popularized by Zander, are described. The German and French schools, and their peculiarities, are fully presented, and the particular shortcomings of the last unsparingly stated. The method of Oertel (*cure de terrain*) is carefully described, a colored map of Reichenhall and its surroundings being of value as an illustration of this chapter. The application of this treatment by exercise occupies the third part, and extends over three hundred pages. The place of exercise in diseases of nutrition, obesity, gout, gravel, diabetes; those of “physiological misery,” suboxidation, and those of the digestive, locomotory, including deviations of the trunk, nervous, genital, respiratory, and circulatory apparatus, receives careful attention, and the indications and contra-indications are stated *in extenso*. The work of Thure Brandt receives especial mention so far as it concerns the gynecological massage. While on the whole we are inclined to take a conservative view of the value and applicability of the system of Oertel in the treatment of cardiac diseases, it is but just to state that the author presents this subject very fully and impartially. Following Huchard, he believes that it is as impossible for some patients suffering from cardiac disease to walk as it is for paralytics. Further, that those cases of cardiac disease which are of a peripheral or vascular origin are not suitable ones for the treatment devised by Oertel. Fortunately for these, the Swedish movements can be of great value.

In pointing out this distinction the author has been just to the so-called cure, and he might have gone a step further and shown that the proportion of cases of cardiac disease in which its origin is to be sought for in the peripheral vascular system is much larger than is commonly supposed, thus more rigidly limiting the cases to which the method of Oertel is adapted. The work is well illustrated by about sixty figures, most of them clearly showing important positions and movements. We believe that it is a decided advantage that active and passive movements, Swedish and mechanical gymnastics, and massage, should be considered in one volume. Their relations and indications, their comparative value, are better understood. As a whole, this volume shows extensive travel, careful study, a scientific spirit in sifting the contradictory statements of physiologists, and in clearly stating the possibilities of exercise, and without ignoring its limitations. It will do much to popularize in the medical profession useful adjuncts of treatment which are now prescribed from an empirical standpoint. It shows the various forms of exercise in their true relation, and is just both to Swedish movements—so called—and to massage. It is not an argument for exercise, save so far as the exposition of its physiology shows it to be important, but it is a book for the physician who knows of and uses the means not to be found in the *Pharmacopœia*.
R. W. W.

A TEXT-BOOK ON DISEASES OF THE EYE. By HENRY D. NOYES, A.M., M.D., Professor of Ophthalmology and Otology in Bellevue Hospital Medical College; Ophthalmic Surgeon to the New York Eye and Ear Infirmary. Second and revised edition. Octavo, 834 pages. Illustrated by five chromo-lithographic plates, ten plates in black and colors, and 269 wood engravings. New York: William Wood & Co., 1894.

SINCE the publication of the first edition, four years ago, the advances in ophthalmic science have not been radical or very striking; but such as they have been we find them well reflected in the revision which this work has undergone. Like every other systematic text-book, there are certain parts of its subject that receive better treatment than others, and the most strikingly strong chapters perhaps are those on binocular vision, which include the anatomy, physiology, palsies, and other disturbances of the ocular muscles; and the chapters upon the optic nerve and amblyopia and amaurosis. These portions are very complete, and have undergone more thorough revision than some others.

In regard to muscular asthenopia, under which heading are considered the disturbances of the balance of the ocular muscles that have in the last few years attracted so much attention, Dr. Noyes has not been blinded by the glamour of operative adjustments and immediate results, yet he quotes at length, and gives considerable attention to the claims of those who have gone most extensively into the cutting and advancing of the ocular muscles. As to the operation to be chosen, he says: "It may be accepted as settled that tenotomy with free dissection of the surrounding tissue is not fitting in muscular asthenopia, and, with high degrees, it is better to divide the operation between two eyes and at a considerable interval. My preference has been to perform complete tenotomy and control its effect by sutures. Partial tenotomies

have, in my experience, been extremely uncertain and usually ineffective."

In discussing the palsies of the ocular muscles, an excellent account is given of the motor nerves which supply them and the nuclei from which they spring, together with their relations to other portions of the central nervous system and intra-cranial structures. And this account is illustrated by numerous diagrammatic cuts. Some of these cuts are repeated in the chapter upon the optic nerve, which includes a very good presentation of cerebral localization as the ophthalmologist needs to know it. The localization of the nerve-fibres distributed to the various portions of the retina as they pass from the optic chiasm forward to the eye is represented by a series of ingenious diagrams, in so far as it has been worked out by the few careful microscopical studies of specimens presenting atrophy of certain bundles of fibres. These enable one to grasp the facts more clearly than any verbal description could possibly do.

The work still remains defective in regard to the errors of refraction and accommodation. The correction of these makes the majority of the practice of the ophthalmic surgeon of the present day; yet they are treated in some seventy pages, less than is devoted to them in many smaller works. And necessarily their consideration is somewhat superficial and very incomplete. For instance, the account of skiascopy consists mainly of extracts from the description of the test given in Mr. Nettleship's little manual of *Diseases of the Eye*.

Mydriatics are spoken of as usually unnecessary for the determination of refraction, as indeed they are unnecessary to an approximation or a probable guess at the degree of ametropia; and homatropine, it is stated, must be used in the strength of twenty grains to the ounce—about double the strength commonly employed by those who rely on it, of whom Dr. Noyes is not one.

The account of the ophthalmometer, though not one that would give the ophthalmologist unfamiliar with the instrument a working acquaintance with it, is more just in its estimate of its value than some others that have emanated from New York. Still, by under-rating of other methods of objectively estimating ametropia, the ophthalmometer is comparatively somewhat over-rated.

Among the additions to the book we find a colored plate, including a number of illustrations used by Mr. Lindsay Johnston in his accounts of the reflexes of the retina and coloboma of the choroid, with one figure of thrombosis of the central retinal vein, and a case of inflammation of the eye from vaccinia.

The general index has been rendered quite complete and satisfactory, and an index of authors referred to has been added. The names of some five hundred different writers on ophthalmology, mentioned in this latter index, most of them with multiple references, give a very fair idea of the breadth and accuracy of the literary research which the book represents.

This edition is printed on paper considerably thinner than that used in the first. But while this renders the volume less imposing in its appearance, the diminished weight and bulk will be appreciated in the crowded library where it is desired for practical use.

E. J.

A CLINICAL TEXT-BOOK OF MEDICAL DIAGNOSIS FOR PHYSICIANS AND STUDENTS. Based on the Most Recent Methods of Examination. By OSWALD VIERORDT, M.D., Professor of Medicine at the University of Heidelberg, etc. Authorized Translation with Additions, by FRANCIS H. STUART, A.M., M.D., Member of the Medical Society of the County of Kings, N. Y., etc. Third revised edition, with one hundred and seventy-eight illustrations. Philadelphia: W. B. Saunders, 1894.

THE fact that Vierordt's *Medical Diagnosis* has in a few years reached, in its English dress, a third edition, and has been translated into Italian and Russian as well as into English, is a good proof of its value, or at least of a demand by the profession for a work of this character. The book has been so often reviewed in the past five years, that we may be pardoned if we content ourselves with saying that the present edition is, in substance, identical with the second, with a few additions and corrections. The author aims, as he states in his preface to the first edition, to give aid toward the making of a practical diagnosis by practical means. "Should the book to any extent antagonize the inclination of our time to theorizing, it would afford me special satisfaction."

There is taken up, first, the General Examination, and then in regular order the examination of the Respiratory, Circulatory, Digestive, Urinary, and Nervous Systems; each subject being systematically and in most respects fully treated. The aim of the book is not to give the complete picture of any particular disease as furnished by the subjective and objective examinations—i. e., to give symptomatology, differential diagnosis, etc., but rather to give the best methods of examination of particular organs, or groups of organs, with an interpretation of the signs found.

The book is not quite so complete as could be wished in some respects—e. g., in bacteriological diagnosis. We are somewhat surprised that the translator, who has made numerous additions, has not given a more detailed description of the examination of the blood for the plasmodium of malaria. The text, too, concerning the examination of the blood in other directions, is lacking in exactness, and in some particulars is positively inaccurate. For instance, the distinction between leucocytosis and leukæmia (spelled in one place leucæmia, in another leukæmia) is stated as merely a difference in degree and not in kind. The statement that leucocytosis is present in typhoid fever is not in accord with most observations. And Ehrlich's idea that eosinophilic leucocytosis is diagnostic of leukæmia has long been abandoned, much larger proportions of eosinophiles having been repeatedly found in measles, in the newborn, and during asthmatic paroxysms, etc. And certainly Vierordt has misread Ehrlich when he says: "His (Ehrlich's) most important result is the discovery that only in leukæmia are there found in the blood white cells called eosinophile—that is, that are distinctly colored with eosin" (page 279).

The index is the most complete we have ever seen, and adds materially to the value of the work as a book of reference; the index alone covers ninety pages. There are numerous good illustrations, many of them original. The work, taken as a whole, is a valuable addition to the library of the practitioner as well as of the student. J. B. H.

A MANUAL OF PRACTICAL HYGIENE, DESIGNED FOR SANITARY AND HEALTH OFFICERS, PRACTITIONERS, AND STUDENTS OF MEDICINE. By W. M. L. COPLIN, M.D., Adjunct Professor of Hygiene, etc., Jefferson Medical College, and D. BEVAN, M.D., Instructor in Hygiene, etc., Jefferson Medical College. With an Introduction by H. A. HARE, M.D., Professor of Therapeutics, Materia Medica, and Hygiene in Jefferson Medical College. Pp. 456. Philadelphia: P. Blakiston, Son & Co., 1893.

A PERSON desirous of obtaining the best single work on hygiene, and having time to make a somewhat exhaustive examination of the various authorities to determine his choice, picks up by chance from a large number of good, bad, and indifferent treatises, manuals, guides, and handbooks, this latest publication by Drs. Coplin and Bevan. Rapidly running the pages over, he sees that it is copiously illustrated, that many of the illustrations are large and fine and some of them printed in colors, and that the diagrams are clear. His appetite for a complete knowledge of hygiene is stimulated, and he eagerly reads the preface. Here he learns that "the authors of this manual have endeavored to prepare a text-book, the first complete work from an American standpoint;" he reads that it has been the desire of the authors "to make the work a practical treatise, with a minimum of theory and a maximum of applicable fact." "The various subjects, water, air, food, habitations, etc., have been thoroughly gone into, each one receiving the consideration its importance merits." Still further he notes that in order to make the book as accurate as possible, skilled specialists in various departments have been consulted in the treatment of the many special subjects which demand expert knowledge. He then turns to the Introduction, written by a gentleman eminent as an author and as a scientist. Here is praise unstinted both for the book and for the authors. The hasty examination of the body of the work, and the reading of the preface and introduction would in many if not in most cases be quite sufficient to convince the seeker after truth of the uselessness of spending time on the examination of the other works, this book being apparently every way qualified to fill the familiar long-felt want. He secures his prize and settles himself down with pleasurable anticipation of a splendid intellectual treat. And what does he find?

Chapter I. opens auspiciously and interestingly. It treats of the maintenance of health, the causes of disease, inheritance, etc. The fourteen pages devoted to bacteriology are disappointing, and the illustrations, although original and pleasing to the eye, could, in many instances, hardly be more incorrect and misleading. Animal parasites are well described. Under "Prevention of Disease," speaking of inherent tuberculous tendency, the authors reverse the formula in the preface and give us a maximum of theory and a minimum of applicable fact. The pages on quarantine, isolation, and segregation contain much useful information, and it would be well if all local health boards could be persuaded of the truth of the statement that "nine times out of ten the stripping of a sick-room of carpet and furniture on the discovery of a case of contagious disease means merely conveying the contagion-bearing material out for dissemination," and that the "danger is not lessened by removal of draperies after the disease has developed." Most of what is said under

this head is good sound sense, but why with proper care and disinfection should "napkins with the food, towels, extra bedclothing, etc., be strictly interdicted?" Under Smallpox we are told that "no clothing, either personal or bedclothing, should be allowed to leave the infected area; it should all be burned; house, bedsteads, and furniture of every kind disinfected; window-hangings, carpets, etc., treated exactly as clothing." In view of the possibilities of efficient disinfection, this is somewhat sweeping. If burning must be resorted to on so grand a scale, why not include the house and furniture? It is more than disappointing to read that the "prevention of smallpox is largely based upon the success of vaccination, a matter into which it is not necessary for us to go." If any matter connected with the prevention of disease is worthy of full discussion, explanation, and illustration, that subject is vaccination. The anti-vaccinationists are a large class; they are not numbered exclusively among the ignorant, nor, indeed, among the laity. The omission is far from commendable.

The authors' observations on the subject of disinfection are not wholly in accord with the opinions of the best authorities.

Chapter II., on Individual and Personal Hygiene, contains much that is amusing if not otherwise of value. No acknowledgment is here made of extraneous assistance by "skilled specialists having expert knowledge," but so much of the chapter as relates to babies and the rearing of children, shows such profound erudition as to suggest that it must have been edited by that generally recognized authority on the subject, the maiden lady of advanced years. The poor mother who should follow the precepts here laid down would find it most inconvenient to bear a second child until the first should have been brought to maturity. The child is "put to the breast as soon after birth as the mother's condition will permit, and should be nursed at regular intervals of two or three hours for the first three or four months." Full directions are given as to the proper way to dress it, and we are especially warned against socks and bare legs, "which, being exposed, favor the development of croup, diphtheria, and intestinal complaints." "The baby should have all the outdoor life that it is possible to give it, and during pleasant days, summer afternoons and mornings, it should be given an outing in the country or on board an excursion boat; on account of the ease by which country air may be applied, the child should advisedly be taken to the country," and poor Mamma can hardly delegate this duty to a servant, but must go in person in order to apply the breast every two or three hours along with the country air so easy of application. The infant grows to childhood, and the first question considered is as to the advisability of allowing him to have the usual contagious diseases of childhood, "such as chicken-pox, measles, mumps, etc." "While it is never wise to rush into danger, in the case of a strong healthy child, there is no reason why an effort should be made to prevent its acquiring any of the mild diseases of childhood" on the old-fashioned idea, presumably, that he has got to have them sometime anyway, and may as well have it over. The authors advocate "scientific romping," which is best indulged in "with the society of selected children who are mutually agreeable to each other." But scientific romping is not enough, and abundant noise is recommended; "let them yell; give them the opportunity to develop the muscular apparatus of the chest, and let them acquire all possible intonations of the voice, from the Indian war-whoop to the confidential whisper of child-

hood." "The all-deforming corset, the circular garter, and pinched narrow shoe with its abominable high heel" are "important and growing evils, the writers are sorry to say, but they none the less demand a hand-to-hand combat, in which good sense, backed by genuine scientific knowledge and a plain dispensation of facts, will, in the intelligent, sooner or later win the day."

When the child is "old enough physically," it is time to think of sending him to school, but the parent is informed that the child's education should be begun at home by training up inquisitiveness, and that he must "have nothing about the house which he has not time to explain." The authors have but a poor opinion of schools and their advantages, and very strong feelings in regard to extra-mural instruction. "The tendency of the times to let somebody else teach the children . . . may be commendable in those who are too ignorant to teach children, but under no other consideration," not even the fact that business, social, and other duties may demand considerable time, and that the one parent must provide the means for sending the other with the latest arrival on the daily trips on excursion boats and into the country for the easy application of country air. "The mother who is too much interested in Christianizing savages, or preventing cruelty to animals, or lifting drunkards, had better set aside some of her enthusiasm in these directions, and let her charity begin at home."

In speaking disparagingly of schools, in most of which the art of writing good English is taught with more or less success, one should be careful not to demonstrate too great crudity of expression. The school-room "is usually a collection of unscientific seats, benches, and desks, with windows facing the pupils if the lighting be at all efficient, and the ventilation a little better than a dungeon, and not quite so good as a ship's hold." One can hardly compare ventilation with dungeons and ships' holds, the object of the former having nothing in common with the uses of the two latter. Of course, the meaning of the authors is apparent, but it is unfortunate that this particular place should have been chosen for an exposition of slovenly composition, which is to be found in considerable profusion elsewhere in the book.

The rest of this entertaining chapter is devoted mainly to information and advice which to most persons is quite unnecessary. We are cautioned, for example, not to allow eyelashes to remain under the eyelids, where they may give rise to irritation of the conjunctiva, advice which is as necessary as admonishing one against undue deliberation in rising after sitting on an inverted tack. The ears must be freed from accumulations of wax, dust, and dirt, "or even the growth of some of the lower forms of moulds," by washing them out three or four times a week. "Children should be fed whenever they are hungry," and "a fruitful cause of diseases in children is regular feeding." The child is taught to keep the teeth clean, and the use of the toothpick after each meal is strongly advocated. The chapter must be read in its entirety to be duly appreciated.

Chapter III. deals briefly with the subject of clothing. Much of the chemistry is novel if not accurate.

Chapter IV., on Food, goes quite extensively into that subject, and in the main is most excellent. Here and there, however, are evidences of a lack of practical familiarity with analysis of foods and detection of adulterations. It is well known, for instance, that the total solids of milk

cannot be determined by means of the lactometer, as asserted by the authors, who, moreover, speak of fat and cream as interchangeable terms, when fat is only one constituent of cream. What the authors mean when, speaking of testing milk with the lactometer, they say, "The method is entirely applicable where prolonged volumetric analysis would not be possible," is not clear, for volumetric analysis of milk is not now, and it is safe to say, from the very nature of the substance, never will be possible. Milkmen, dairymen, and chemists will be interested to know that "Another very common method of adulteration consists in extracting a portion of the cream; this is accomplished at creameries constructed for the purpose." A milkman requires no assistance at the creamery in removing part of the cream, for the process is quite simple and easily carried out at home. Creameries are not constructed for the purpose of removing part of the cream from the milk, but for the purpose of removing all that can be removed and converting it into butter on a large scale.

Among other erroneous statements it may be noticed that Rhine wines contain from 5 to 6 per cent. of alcohol. And under Coffee, "The chicory berry is commonly used as an adulterant of coffee, and may be readily detected by the microscope. The berry sinks immediately in water, while coffee floats for a short time." As a matter of fact, there is no such thing as a chicory berry. The *root* of the chicory plant, however, when dried, roasted, and ground, has been used for more than a century as an adulterant of coffee. In the main, however, this chapter has considerable value, and that part of it which is devoted to the inspection of meats is particularly good.

Chapter V., on Water, is so far behind the times and so full of erroneous statements as to be fully qualified for bodily insertion into a report of the Rivers Pollution Commission of England.

Chapter VI., on Air, contains many ideas not in accord with scientific facts, and is one of the weakest in the book.

Chapters VII. and VIII., on Climate and Soil, are extremely good, and the pity is that they are not longer. Chapter IX., on Habitations, is also of great value, although much of it is hardly within the scope of hygiene. Chapter X., on Sewage, contains little of value. The authors ought to state in what cities the sewage is of that kind which requires "suitable screens to arrest the coarser products, such as babies and other foreign material which may have either purposely or accidentally been cast into it." Chapter XI., on Disposal of the Dead, advocates cremation as against earth-burial, discountenances hermetically sealed coffins, and condemns embalment, receiving-vaults, and all temporary or provisional repositories. Chapter XII. is devoted to "Technic."

Turning again to the preface: "The authors of this manual have endeavored to prepare a text-book, the first complete work from an American standpoint." The "first complete work from an American standpoint" is yet to be written.

C. H.

PROGRESS OF MEDICAL SCIENCE.

THERAPEUTICS.

UNDER THE CHARGE OF

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MEDICAL SCHOOL AND HOSPITAL; VISITING PHYSICIAN TO ST. MARK'S HOSPITAL.

DIPHTHERIA ANTITOXIN.

DR. O. HEUBNER believes that the serum now furnished for the treatment of diphtheria can be measured as to its strength, and so its proper dosage can be arrived at. It has also been demonstrated to be harmless both as to local as well as to general manifestations. The strength of the serum is such that one part of serum by subcutaneous injection will surely kill twenty-five hundred times its weight of guinea-pig. In the treatment of these cases a syringe which can be made aseptic, for instance the Koch bulb-syringe, is employed. The glass cylinder and the needles are boiled in a 10 per cent. soda solution. The site chosen for the injection is either between the clavicles, under the ribs, in the flanks, or on the inner side of the thigh. The skin is washed with soap, cleansed with ether, and the physician sterilizes his hands. Before the syringe is filled directly from the bottle, it and the canula are again cleansed with ether and alcohol. After the injection the puncture is covered by a bit of rubber adhesive plaster.—*Deutsche medicinische Wochenschrift*, 1894, No. 36, S. 701.

ANTITOXIN IN THE TREATMENT OF TETANUS.

DR. VON HACKER has successfully treated two cases. The first had received chloral and morphine without success. The antitoxin was begun on the fourth day, and cure resulted in eighteen days. The second case received treatment six weeks after the injury, and it was continued for sixteen days. The prognosis in the first case was gloomy, and in the second hopeless. The cost of the treatment is almost beyond the reach of the ordinary prescriber, as the cost of the drug alone, for the two cases cited, was ninety dollars.—*Medical Press and Circular*, 1894, No. 2879, p. 31.

DRS. G. TIZZONI and G. CATTANI, report a successful case, the treatment being commenced twenty-four days after the injury. They give full instruc-

tions for its administration. The anti-tetanic serum is prepared in a dry state and in an absolutely aseptic mode, and it will keep a long time without change if preserved from damp. It is to be opened only at the moment of preparing the injection. As a solvent, distilled water is to be used, boiled for several minutes and then cooled, in the proportion of one part by weight of desiccated serum to ten parts of water. A hypodermatic syringe of from one to two drachms capacity is employed. The instruments must be sterilized by heat, but not by chemicals, and allowed to cool before using. The quantity to be used varies according to the gravity of the case and the time at which the treatment is commenced. If the case is not of exceptional gravity, for the first injection, one-half of the contents of the glass tube [capacity not stated] is necessary for the first injection. The remainder is divided into four doses, to be used during the following four days, the proper interval to be determined according to the effect produced upon the course of the tetanic phenomena. If the case is one of great gravity it may be necessary to use the entire contents of the tube for the first injection.—*Medical Press and Circular*, 1894, No. 2884, p. 155.

DR. W. HÜBENER, from laboratory experiments, concludes that the serum of Tizzoni is not ten times stronger, but more likely three or four times weaker, than that of Behring. The tetanus antitoxin as furnished by Merck does not meet, upon animals the subject of experiment, the expected efficiency. It is not likely to cure severe cases of tetanus in man or those that come late under treatment.—*Deutsche medicinische Wochenschrift*, 1894, No. 33, S. 566.

THE TREATMENT OF DIPHTHERITIC ANGINA BY SUBLIMATE.

DR. MOIZARD recommends the use of sublimate in glycerin in the proportion of one to twenty or to thirty, which forms a syrupy, transparent liquid, which is not caustic. The affected parts are cleansed, the solution applied on cotton from which the excess of liquid has been removed, and the surrounding tissue being protected from the action of the solution by absorbent cotton held in forceps; this also prevents the swallowing of the solution. Of 261 cases treated, the proportion of cases cured varied from 95 to 81 per cent.—*Journal de Médecine et de Chirurgie Pratiques*, 1894, 14e cahier, p. 561.

THE INFLUENCE OF ATROPINE UPON THE RESPIRATION.

DR. ALFRED LEVISON, after a careful experimental study, concludes that atropine in large doses is of value in cases of morphine poisoning, in that it stimulates the respiration. This stimulation appears to be through the central organ in the brain. The stimulation of the heart is also of therapeutic value. The stimulating action of large doses of atropine can easily go on to a paralyzing effect, especially if they are carried directly into the blood current.—*Berliner klinische Wochenschrift*, 1894, No. 39, S. 891.

THE TREATMENT OF CROUPOUS PNEUMONIA.

DR. PERCY KIDD refers to two remedies only. Opium is contraindicated when symptoms arise which indicate impending exhaustion of the respiratory

centre, shallow, labored respiration, drowsiness, and a tendency to cyanosis. The indications are severe pain which cannot be controlled by other measures, insomnia, restlessness, and delirium. It is administered in one considerable dose at bedtime, either as ten grains of Dover's powder or one-sixth to one-quarter of a grain of morphine hypodermatically. Strychnine is administered hypodermatically, one-sixteenth of a grain being dissolved in four or five minims of water, and injected subcutaneously, or preferably into the gluteal muscles. If the tension of the pulse begins to sink, or if the frequency of the beats be much increased, and especially if the frequency of the respiratory movements also become much increased, this remedy should be used. This dose may be repeated every two hours until three or four doses have been given, then once or twice in the twenty-four hours. These injections have, in some cases, been more satisfactory for the relief of delirium than alcoholic stimulation.—*The Practitioner*, 1894, No. 315, p. 183.

CHLORAL FOR HÆMOPTYSIS.

DR. J. PAL believes that chloral possesses the advantages, over ligation of the limbs, of diminishing blood pressure for a longer period, and the returning increase of blood pressure is not so rapid as after loosening the bands. He has treated fifteen severe cases, all young individuals with sound hearts. The drug was administered by the rectum in from fifteen to forty grain doses. The hemorrhage ceased in the majority of cases in from one-half to three-quarters of an hour; in others it persisted for eight to twelve hours. In several instances the remedy seemed to be prophylactic.—*Centralblatt für die gesammte Therapie*, 1894, Heft, 8, S. 385.

THE TREATMENT OF ACUTE PHTHISIS.

DR. POTAIN recommends quinine-sulphate and tannin. The first is a good antiseptic, and it can lessen the fever. Antipyrin is not advisable for the last purpose, because the temperature is not very high, and temperature of itself is not dangerous; besides this drug disturbs the economy more than does quinine, and it causes a great depression of the nervous system. The use of tannin is purely empirical; there is no connection between this substance and the modifications of the tuberculous proliferation. Clinically it is of use; in the first period of phthisis it is efficacious against the congestive attacks. Experimentally it has been shown that rabbits which have ingested tannin were more refractory to inoculation of tuberculosis than the control animals. A repetition of these experiments showed a contrary result, perhaps because the doses were too strongly increased, so that the general condition of the animals was disturbed. This drug is given in daily dosage of from thirty to forty-five grains.—*Journal des Practiciens*, 1894, 2d semestre, No. 13, p. 142.

A NEW METHOD OF CURE OF PULMONARY TUBERCULOSIS.

DOTT. CARASSO GIOVANNI MICHELE, after discussing the various methods in use or abandoned for this disease, proposes the employment of inhalations of the essential oil of peppermint, five or six drops, four or five times daily,

from an inhaler, the internal use of about a 1 per cent. solution of beechwood creosote in a solution composed of alcohol, glycerin, chloroform, and essence of peppermint, a dose of a dessertspoonful every three hours during the day in a half glass of sweetened water. The diet is to be abundant and nourishing, even to super-alimentation.—*Giornale Medico del R. Esercito e della R. Marina*, 1894.

THE TREATMENT OF FŒTID BRONCHITIS.

DR. LANCEREAUX recommends sodium hyposulphite in the daily dose of sixty grains, which should not be surpassed, because of the likelihood of causing diarrhoea. This dose can be administered in syrup of eucalyptus or in a mucilaginous julep. It is also useful in cases of bronchial dilatation and in pulmonary gangrene.—*Journal des Practiciens*, 1894, 2d semestre, No. 27, p. 315.

THE TREATMENT OF WHOOPING-COUGH.

DR. A. VIGNOL advises a mixture of belladonna and aconite before meals, in increasing doses, given with Malaga wine or with water. Belladonna renders the expectoration less fluid and more difficult to raise. As the nauseating expectorants, if continuously employed, destroy the appetite and increase the bronchial secretions already abundant, their use is replaced by an emetic given every three or four days. After fifteen days of this medication this treatment should be suspended and potassium bromide given in its place. In looking after the general health tonics are always indicated, and in particular, wine of kola. Of the antiseptics employed, balls of camphorated naphthalin, as found in the shops, may be placed about the child, sulphurous acid may be sprinkled about the bed; a napkin moistened with a concentrated alcoholic solution of carbolic acid may be placed under the bed.—*Journal des Practiciens*, 1894, 2d semestre, No. 4, p. 44.

ANTIPYRETIC EFFECTS OF EXTERNAL APPLICATIONS OF GUAIACOL.

DR. ALFRED H. CARTER has made one hundred and fourteen trials upon thirteen cases, with the result of reducing the temperature in one hundred and four instances; in one-half of the failures the temperature was normal at the time of application. Pure guaiacol was used sixty-eight times, creosote in the remaining instances. The liquid drug was rubbed into the axilla at 5 or 6 P. M., the quantity usually employed being one drachm, but in a few instances only one-half of a drachm was used. The guaiacol was distinctly more energetic in its action than creosote. Beside the fall of temperature, other phenomena were noted; temporary smarting and burning of the skin at the site of application; almost invariably, marked sweating; if the temperature fell to below normal then there were symptoms of collapse, but only once to a serious extent; after its reduction the temperature rose abruptly; the frequency of both pulse and respiration was reduced, but not to an extent greater than would be accounted for by the diminished fever; the quantity of urine was greatly increased, with a corresponding fall in specific gravity, and both an absolute and relative diminution of its solid constitu-

ents. After the external administration of guaiacol it appears in the urine in fifteen minutes, reaching its maximum in from one and one-half to four hours, then decreasing rapidly for six or seven hours, till at the end of twenty-four hours only a trace was observed. No less than 55½ per cent. was eliminated in this way. He concludes: 1. That used in this way guaiacol is a valuable addition to our list of trustworthy antipyretics; and although the tendency of recent experience is greatly to restrict the usefulness of this class of remedies, yet whenever the employment of an antipyretic is indicated, guaiacol offers advantages which deserve attention. 2. That, by virtue of its diaphoretic effects, it may possibly be of value as an eliminant in adynamic conditions arising from the retention in the system of toxic substances. 3. That, by reason of its anti-microbic properties and the large amount of the drug which can be introduced in this way into the system, it is likely to be of service as an internal antiseptic, especially in the treatment of phthisis. For therapeutic purposes twenty to thirty minims would generally be sufficient.—*British Medical Journal*, 1894, No. 1749, p. 6.

THE VASO-DILATOR ACTION OF STRYCHNINE.

M. C. DELEZENNE recalls the observation of Wertheimer that at the moment when the arterial pressure rises under the influence of a strychnine injection an intense redness invades the mucous membranes of the lips and tongue. In a series of observations upon temperature, venous pressure, and from a consideration of the literature it is probable that the peripheral arterioles do not share in the constriction which affects the deep vessels. Evidently then, strychnine is an enegetic dilator of the peripheral vascular network, and if its action upon the whole of the vasomotor system is taken into consideration it appears to be identical with that of asphyxia and of excitation of sensory nerves.—*Archives de Physiologie*, 1894, No. 4, p. 899.

THE THERAPEUTIC EFFECTS OF DIGITOXINE.

M. MASIUS has used this drug in his clinic for more than a year. The formula employed has been that of Adrian, or one hundredth of a one per cent. solution in alcohol and sweetened water. The dose is two teaspoonfuls, representing one-sixty-fourth of a grain, which is administered in three doses at an interval of four hours. The diseases in which it has been employed are pneumonia, typhoid fever, and cardiac affections. The cases have been carefully observed, and the following conclusions are offered: 1. That it acts rapidly and energetically, the gastric disturbances being neither frequent nor considerable. 2. Its action upon the circulation is evident after twelve hours, more frequently after twenty-four hours; the cyanosis, the respiratory disturbance yields at the end of this time, the volume and resistance of the pulse increase, the inequality and irregularity disappear, the frequency becomes reduced within normal limits; the patient feels better, the nights are satisfactory and the general condition improved. 3. The diuresis is not slow in being influenced, and may attain in certain cases four quarts per day, reached on an average, at the end of twenty-four hours. The effect of the drug lasts ordinarily from eight to ten days. 4. In pneumonia

its action upon the temperature is noted at the the end of twenty-four to forty-eight hours; the tonic effect upon the pulse is the same as in heart-diseases. 5. In typhoid fever the action upon the temperature and circulation is favorable.—*Bulletin de l'Académie Royale de Médecine de Belgique*, 1894, No. 6, p. 323.

THE USE OF SPARTEINE IN CHLOROFORM NARCOSIS.

MM. P. LANGLOIS ET MAURANGE, after noting that various clinicians have demonstrated that sparteine is a regulator of the heart, state that it also diminishes the excitability of the pneumogastric. In rabbits, after a preliminary injection of one-half grain, easy and deep chloroformization is obtained. Manometric tracings show that, although there is a respiratory arrest caused by contact of the chloroform upon the nasal mucous membrane, the heart rapidly regains its rhythm. The diminution of the excitability of the vagus can be shown even with small doses. In dogs, besides the regularity of the cardiac tracing, the persistence of the arterial pressure is noted even during profound narcosis. In man, one-half to two-thirds of a grain of sparteine and one-sixth of a grain of morphine, fifteen minutes before chloroformization, often in cases of cardiac disease, or in long operations, has been used, and the heart has always remained perfectly regular and strong.—*Les Nouveaux Remèdes*, 1894, No 15, p. 344.

THE COAGULABILITY OF THE BLOOD.

DR. A. E. WRIGHT has indicated one method of increasing the coagulability of the blood—by the addition of lime salts to it; one-quarter to one-half of one per cent. solution of calcium chloride acts as a physiological styptic. The efficacy of these styptics may be increased by combining the calcium chloride with solutions of cell nucleo-albumins, that is, with albuminous substances which can be obtained from the aqueous extracts of any cellular tissues; for example, thymus, thyroid, testicle, gastric, or other mucous membranes. It was found that: 1. The addition of calcium chloride to extra-vascular blood causes it to coagulate more rapidly. 2. The internal administration of calcium chloride often causes an arrest of hemorrhage. 3. The continued administration of large doses of calcium chloride is not effectual in keeping up a permanent condition of increased blood coagulability. 4. A very appreciable increase of coagulability may be obtained by the administration of carbonic acid, but it is essential that a sufficiency of oxygen, or of ordinary air, should be administered with the carbonic acid, and it should be remembered that intra-vascular thrombosis may occur when carbonic acid is administered to an animal whose blood coagulability is abnormally high. 5. Alcohol diminishes the coagulability of the blood, as also do rapid respiratory movements.—*British Medical Journal*, 1894, No. 1750, p. 57.

CHLORALOSE.

MR. CHARLES FLEMMING, in a clinical paper concludes that we may expect benefit from this drug in all forms of functional sleeplessness, in the insomnia of psychical excitement, of hysteria, of neurasthenia and over-

work, of functional cardiac irritability, and in attacks of epilepsy and somnambulism. Secondly, its use may enable us to separate objective from subjective pain, and so help, for instance, in the differential diagnosis of some forms of hysteria. It will avail nothing in the insomnia of alcoholic excitement, multiple neuritis, or cerebral hemorrhage, or the sleeplessness due to any painful organic lesion or peripheral irritation. In the insomnia of lunatics, when there is depression, it is said to be useful if given in large doses. In the early stages of Bright's disease, chloral, owing to its effect on the blood-pressure, is probably more efficient.—*The Practitioner*, 1894, No. 313, p. 8.

THE TREATMENT OF CANCER OF THE STOMACH BY SODIUM CHLORATE AND ARISTOL.

DR. HENRI HUCHARD uses the first-named drug in daily amounts of from 150 to 180 grains dissolved in from 5 to 7 ounces of water, not as one, but in divided doses, so that a continuous topical action may be maintained, not only upon the tumor but also upon the gastric mucous membrane. If the larger dose is surpassed symptoms of gastric irritation supervene, and vomiting, and the remedy can no longer be borne. To definitely state if this be a curative agent many years of observation are needed; it can, however, be definitely stated that sodium chlorate in large doses has a very favorable action upon functional disturbances of the stomach. It increases the appetite, diminishes pain, makes the vomiting of food to disappear, and causes the hæmatemesis to cease. Aristol has been found to be inferior to sodium chlorate, but is useful, if the stage of ulceration has been reached, because it appears to possess a local action in the digestive canal when given in pill-form, in doses of three or four, of one and one-half grains each, daily. These remedies should be used, at least, because they relieve the functional disturbances.—*Journal des Practiciens*, 1894, 2d semestre, No. 19, p. 217.

TRIONAL POISONING.

DR. EWALD HECKER reports the case of a woman, aged fifty years, who had suffered for ten years from marked melancholic depression. Previous experience had shown that a night dose of forty-five grains of trional had been followed by excellent results. After ten days' use of this remedy the patient began to complain of pains in the neck and coryza, and, because of a slight fever, remained in bed. Vertigo appeared after a few days, and she fell while walking, and felt dull and wretched. The symptoms of commencing paralytic dementia now appeared, which continued. The remedy was now omitted, and after ten days she was able to leave her bed and gradually regained her strength. The remedy was employed for only thirty-six days in the above mentioned dose. The explanation of the symptoms may be found in the observation of Mosso, that in natural sleep the cerebral temperature is unchanged, or indeed is lowered, if sleep be prolonged. In artificial sleep this temperature is raised, while that of the rectum remains constant. It may be, then, he concluded, that during artificially produced sleep, active oxidation processes go in the cerebral cells, which result in profound disturbances.—*Centralblatt für Nervenheilkunde und Psychiatrie*, 1894, Band iv., S. 401.

THE TREATMENT OF DELIRIUM TREMENS.

DR. RUSSELL BELLAMY immediately on the admission of a patient administers a calomel purge and twenty grains of trional mixed with water, with ten minims of tincture of capsicum. If the condition warrants, a very hot bath is given, its temperature being gradually lessened. If the delirium showed no signs of abatement in thirty minutes, ten grains of trional are given. In all cases forced feeding in small quantities, often repeated, was followed, the diet consisting of milk, eggs, and soups. He concludes: 1. Delirium was controlled with greater rapidity and safety by trional than by other hypnotics. 2. In the majority of cases a marked stimulant effect was observed, possibly on account of the methylic and ethylic elements which enter into the drug. 3. On account of the low temperature noted in all cases, trional must possess antipyretic properties, thereby simulating its allies of the phenol group. 4. It was always well borne by the stomach, and in one case was rapidly absorbed when administered *per rectum*. 5. No unpleasant after-effects were observed, and in all cases save two, recovery was speedy.—*New York Medical Journal*, 1894, vol. lx, p. 72.

MALIGNANT INDIAN SYPHILIS TREATED WITH THYROID EXTRACT.

MR. T. DUNCAN MENZIES reports four cases, drawing attention to the following considerations: 1. The exceptional virulence of the poison. 2. The undeniable value of the thyroid extract given alone, without any mercurial preparations. 3. The hydropic and absorbent properties of the powdered extract. He has found it useful for insufflation and dusting purposes. He is inclined to regard the remedy as a powerful skin-tonic and adjuvant to the mercurial and alterative treatment of syphilis.—*British Medical Journal*, 1894, No. 1749, p. 12.

THE TREATMENT OF TYPHOID FEVER.

DR. WILLIAM H. BROADBENT believes that the first task should be to prevent over-feeding. An average amount of food would be about two pints of milk and one of broth or beef-tea in the twenty-four hours, to be given eight or ten ounces at a time, at intervals of about two and a half to three hours by day, less frequently at night. Soda- or lime-water should be added to the milk, or it may be diluted with barley-water, to prevent premature coagulation, or more effectual, is peptonization. Stimulants should be used when required, one and a half, two, or three ounces of brandy, in divided doses and taken with or after the milk or other nourishment. Ten ounces in the twenty-four hours is the maximum. A change in the stimulant often does better than an increase in the quantity, as substitution of whisky, or port, or old Madeira, or Malmsey, or champagne for brandy. For sleeplessness opium is preferred. For intestinal antiseptics mercurial preparations are almost exclusively relied upon; the corrosive chloride with quinine, or calomel, in one-third of a grain doses every three or four hours. Intestinal hemorrhage is combated by a large ice-bag over the right iliac fossa, the administration of a full dose of some liquid preparation of opium and

the subcutaneous injection of ergotin. Ten or fifteen minims of turpentine may be given every three or four hours. The most efficacious means of controlling the heat of fever is in the application of water to the surface of the body, the latest development being the continuous bath-treatment of Burr, which has been used for several years with remarkable success.—*Medical Press and Circular*, 1894, No. 2885, p. 177.

DR. ISAAC T. YOUNG avoids coal-tar antipyretics, uses Dover's powder when indicated, cold to the head, and when nothing is indicated nothing should be done. His patients often do well with nothing but good nursing and sustaining measures. It is not good practice to physic the patient because he has fever and that when he is comfortable and doing well. The fever is a symptom, and unless we can remedy the cause it is better to keep our hands off until there are indications for treatment; then meet the indications in as mild a manner as possible.—*New Orleans Medical and Surgical Journal*, 1894, No. 12, p. 897.

GUAIACOL POISONING.

DR. OSCAR WYSS reports a very carefully observed case. The patient, a nine-year old girl, took by mistake one and one-quarter drachms. The face became cyanotic, corneal reflex almost completely abolished; pupils in mid-dilatation, non-responsive or only slightly so; severe vomiting movements; flow of saliva from the mouth; the pulse regular, weak, 134 per minute; cutaneous sensibility diminished; the patient was apathetic, and later vomited food mixed with brown- and with bile-colored mucus. The urine was dark in color, of an aromatic odor; biliary coloring matter present. The Ehrlich diazo-sulpho-carbolic reaction was present, as was also albumin to 2 per cent. There was a marked increase of sulphates, phosphates, and uric acid. The necropsy showed a glossitis, superficial pharyngitis, acute follicular gastritis, with small excoriations, enteritis, very large spleen, commencing parenchymatous degeneration of the liver, with icterus, acute hemorrhagic nephritis with hæmaturia and hæmoglobinuria, dilatation of the heart with parenchymatous degeneration of the muscle, ecchymosis in the pleura, peri- and endocardium and peritoneum.—*Deutsche medicinische Wochenschrift*, 1894, No. 13, S. 296.

DEATH FROM ETHER.

DR. HERBOLD reports an instance of a patient with healthy lungs, but whose heart presented incompetent and thickened aortic valves, with hypertrophy of the left ventricle, dead after the administration of two and one-half drachms of ethyl bromide, followed by seven and one-half drachms of ether at the commencement. During forty-eight minutes the ether was continued until in all about eight ounces were used. The pulse became weaker and suddenly the respiration failed. Artificial respiration, faradization of the phrenics, and cardiac massage were resorted to in vain. For all that the left ventricle was found to be hard and well contracted; death was attributed to cardiac paralysis. The right ventricle was dilated, the lungs congested, and mucous membranes congested.—*Deutsche medicinische Wochenschrift*, 1894, No. 16, S. 361.

[In spite of the argument which is advanced to show that the ethyl bromide was not responsible for the fatal termination, we are of the opinion that the verdict of death from ether should have been, in this case, at least the Scotch one, not proven.—R. W. W.]

THE DANGER OF NECROSIS IN DIABETICS.

DR. ERNST BECKER believes with König, that operations should be carried out with particular attention being paid to two facts: 1. Absolute local antiseptic procedure. 2. Preliminary anti-diabetic diet. In all cases the attention should be called to the probability of diabetic coma following the narcosis. Two fatal cases are reported in which the death could not be attributed to the operation.—*Deutsche medicinische Wochenschrift*, 1894, No. 16, S. 359.

[Not only should the warning be published as to the possibility of a fatal result following operative interference, but as well the fact, first pointed out by Verneuil, be borne in mind that a latent glycosuria may be roused to activity by surgical intervention.—R. W. W.]

THE TREATMENT OF MULTIPLE NEURITIS.

DR. E. LEYDEN believes that the prophylactic treatment consists in avoiding too early getting out and too great muscular exercise after convalescence from acute diseases; the abstinence from alcohol, the avoidance of lead-poisoning, and the importance of an anti-diabetic diet. For specific treatment mercury has been used, but it fails, as in the case cited. Occasionally, the salicylic preparations yield good results, and this also can be said of potassium iodide. Of more importance are anodyne remedies, the salicylates, antipyrine, phenacetin, exalgin, euphorin, and of late methylene-blue has been recommended. In more severe pain morphine, chloral, and sulphonal are required the first, finally subcutaneously. Other drugs must be used according to the symptoms, as stomachics, analeptics, roborants. Massage and baths—the latter in the later stages of the disease—are a useful addition to the treatment. A remedy—strychnine—formerly considered of importance in peripheral, hysterical and anæsthetic paralyses, may be valuable when used in these cases. This should be given subcutaneously in doses of one, two, or three sixty-fourths of a grain twice daily. Rest is of great importance, in order that the pain may be lessened. Exercise for the unaffected parts of the body is necessary. The diet should be generous in order to put the atrophied and degenerated muscles in the best possible condition. It is necessary at all times to encourage the patient in order that he may not become discouraged on account of the long duration of his illness and his slow progress toward recovery.—*Berliner klinische Wochenschrift*, 1894, Nos. 19, S. 439; 20, S. 472.

THE TREATMENT OF THE URIC ACID DIATHESIS.

DR. JOHN F. BARBOUR points out the chemistry and physiology of this condition, quoting from well-known writers upon the subject. The relations of this condition to gout, articular rheumatism, migraine, cutaneous affec-

tions on the one hand, and to certain nervous diseases on the other, as neurasthenia, hysteria, epilepsy, hereditary forms of insanity, general paresis, locomotor ataxia, the pathology as it is shown in the kidneys, bloodvessels, and the nervous system, are carefully presented. In the acute attack, piperazine seems to give the speediest results, and of the use of this remedy three cases are reported. Fifteen grains of the drug, dissolved in one ounce of water, are to be used each day. This is to be further diluted by the addition of a small quantity of this solution to each tumbler of drinking-water, and the free use of water both externally and internally is recommended. It is believed that this method eliminates the excess of uric acid and aborts the further diathesis. The treatment of the diathesis is entirely hygienic and dietetic; the patients should keep a perpetual lent. "They are like a smoky flue; everything must be done to increase the draught." The diet should be non-nitrogenous, and the patient should take abundant exercise in the open air.—*The American Therapist*, 1894, No. 12.

THE POST-MORTEM DETECTION AND ESTIMATION OF STRYCHNINE.

MR. ALLERTON S. CUSHMAN finds that the greatest difficulty which presents itself is the separation of the alkaloids from the various extractive fatty, sugary, and pigmentary matters derived from the stomach contents or organs under examination. The danger of error has also been noted from the formation of cadaveric alkaloids or ptomaines in decomposed bodies, which may in some of their reactions simulate those of strychnine. While this is probably true, it is not likely that any alkaloidal substance other than strychnine itself could be mistaken for it, if all possible tests, chemical, physiological, and morphological be tried. It is important that the quantity of strychnine should also be determined. A method of analysis is presented by which it is believed that 84 per cent. of the strychnine present in complex organic mixtures can be recovered, and two cases are reported which tend to show that this opinion is based upon correct reasoning and chemical procedure.—*Transactions of the Academy of Science of St. Louis*, 1894, vol. vi., No. 17.

THE TREATMENT OF PYOTHORAX.

DR. CARL BECK presents a convincing argument for the treatment of the condition by free incision, excision of rib, thorough evacuation, and drainage, the whole under antiseptic precautions. The technique is so much improved that it is no longer a formidable operation.—*New York Medical Record*, 1894, No. 1228, p. 622.

MEDICINE.

UNDER THE CHARGE OF

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HOSPITAL FOR CHILDREN;

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ASSISTED BY

AUGUSTUS A. ESHNER, M.D.,

ADJUNCT PROFESSOR OF CLINICAL MEDICINE IN THE PHILADELPHIA POLYCLINIC.

A CONTRIBUTION TO THE STUDY OF ACUTE LEUKÆMIA.

HINTZE (*Deutsches Archiv für klinische Medicin.*, Bd. liii., H. 3, 4, p. 377) has reported the case of a youth, sixteen years old, who, without prodromal symptoms, was seized with rheumatic pains in both ankles. The temperature rose and there was excessive perspiration. In the course of two days the spleen was found to be enlarged and sensitive. Upon the lower extremities there appeared several red spots, as in erythema nodosum. The enlargement of the spleen increased, and the liver also began to enlarge. The skin about the red spots became infiltrated, and new spots appeared upon the trunk. Later the lymphatic glands underwent enlargement, while the spots continued to extend. Examination of the blood showed a marked increase in the number of white corpuscles, leucocytes with a large, round nucleus and a small margin of protoplasm predominating. Eosinophile cells were present in small numbers. Micro-organisms were visible in strikingly large numbers, partly arranged in small groups and partly in chains, so that there was some doubt as to whether they were staphylococci or streptococci. The enlargement of both liver and spleen progressively increased. The spots in various parts of the body underwent degenerative change, and around some firm nodules formed. The teeth became loose and from time to time epistaxis occurred. An external otitis developed, with copious hemorrhagic discharge. The gums and lips bled readily. A second examination of the blood yielded results similar to those of the first, except that the micrococci were present in smaller numbers. The heads of the bones entering into the formation of the elbow-joint and ankle-joint became enlarged and sensitive to pressure. The liver and spleen now began to diminish in size, although from time to time new spots appeared upon the body. An effusion took place into the right pleural cavity. This had to be evacuated, and a canula was introduced. Some fluid was at a later date also poured out into the left pleural cavity. The bowels became loose and the temperature subnormal. The urine was for a time suppressed and later contained albumin. The

patient became delirious and finally developed a condition of collapse, from which he failed to rally, and death ensued.

Upon post-mortem examination, the lymphatic glands were found universally enlarged and firm. The pericardial cavity contained an excess of serous fluid. The left pleural cavity contained considerable effusion. The lower lobe of the left lung contained two small abscesses. The right pleural cavity also contained fluid. The spleen was enlarged (4.7 by 7 in.), its surface smooth, and presenting an area of infiltration anteriorly. The kidneys measured 2 by 3 by 5.8 in.; the liver, 9 by 11.7 in. The mesenteric glands were enlarged and soft. The solitary follicles and Peyer's plaques were unchanged. There were no ulcers or cicatrices in the bowel.

Microscopic examination disclosed the presence in the lungs, liver, kidneys, spleen, bronchial and mesenteric glands, as well as the pancreas, of cocci morphologically like those found during life in the blood.

The case is believed to have been one of acute leukæmia of lienal-splenic-myelogenous type. Although an etiologic influence is ascribed to the micro-organisms found both in the blood and in the various viscera, these are not considered specific. On the contrary, the view is expressed that various micro-organisms, as well as various toxic agents, may give rise to the clinical picture of leukæmia. In this way it is theoretically suggested there may be an inter-relation between infectious diseases attended with acute, transient leucocytosis; chronic infectious diseases, attended with leucocytosis of longer duration and destruction of red blood-corpuscles; acute leukæmia, that is, febrile diseases with leucocytosis and glandular enlargement; chronic leukæmia, with acidophile and neutrophile cell-granulation; universal lympho-sarcomatosis, with acidophile and neutrophile cell-granulation leucocytosis; and universal lympho-sarcomatosis without cell-granulation and leucocytosis (so-called pseudo-leukæmia).

COEXISTENCE OF EXOPHTHALMIC GOITRE AND SCLERODERMA.

At the recent Congress of the French Association for the Advancement of Science, JEANSELME (*Mercredi Médicale*, 1894, No. 36, p. 437) reported the case of a woman, fifty-eight years old, who at the age of twenty noticed an enlargement of the thyroid gland, which underwent little increase until the age of fifty, when she lived in the tropics and was attacked with intense and rebellious dysentery. During the course of this illness the goitre rapidly increased in size without subsequent diminution. The skin covering the swelling presented dilated veins, but there was no pulsation. The enlargement involved the right lobe of the thyroid gland and descended to the level of the sternal notch, rising to the level of the hyoid bone a little to the left of the median line and upon the right, insinuating itself upon the sternal mastoid muscle. Exophthalmos was slight but distinct. From time to time there occurred sudden and transient attacks of amaurosis attended with syncope, but never with complete loss of consciousness. The pulse ranged from 90 to 96, but there was no complaint of palpitation. Tremor was present, but not constantly, and especially on emotion. Within two years symptoms of scleroderma had appeared. There was first noticed a local asphyxia of the fingers, accompanied by marked sclerodactylia. The hands and the fingers appeared as if encased in a cuirass of sclerotic tissue. The

finger-pulps were thickened, hard, and swollen. The skin of the face was similarly affected. Sensibility was impaired upon the involved parts. The skin upon the dorsal aspect of the hands, the upper part of the trunk, and the lower portion of the abdomen was markedly pigmented. The extremities were cold and pale. In explanation of this association of exophthalmic goitre and scleroderma two propositions are offered: either that both conditions are due to a common cause, or that the second is the result of the first. The first proposition is supported by the fact that both exophthalmic goitre and scleroderma occur most frequently in females of neuropathic tendencies. On the other hand, it is conceivable that a derangement of the function of the thyroid gland may seriously affect the nutrition of the skin.

SUBCUTANEOUS TRANSFUSION IN COLLAPSE FROM CHOLERA MORBUS.

WILLIAMS (*Boston Med. and Surg. Journal*, vol. cxxxi., No. 14, p. 340) has reported the case of a man, fifty-six years old, who, following exposure to cold on a hot day, became chilly and had slight diarrhœa, together with cramps in the legs and abdomen, with vomiting and large watery dejections. The symptoms progressed despite active treatment. The patient went into a state of collapse and appeared to be rapidly becoming moribund. The surface of the body was bathed in cold sweat, the face was pinched and drawn, the nose pointed, and the legs mottled. Respiration was hardly perceptible, and no pulse could be detected in the radial, brachial, or femoral artery. By means of a reversed aspirator a quart of a solution containing fifteen grains of sodium bicarbonate and half a drachm of sodium chloride, and having a temperature of 105° was injected beneath the skin. This procedure was followed by immediate improvement. The radial pulse became distinctly evident; the respirations became more rapid and full, and the surface of the body warmer. From this time there was progressive improvement, and after six days the patient was nearly well.

LIPÆMIA.

GUMPRECHT (*Deutsche medicin. Wochenschr.*, No. 39, p. 756) has reported the case of a laborer in a brewery, twenty-one years old, of pallid appearance and moderate panniculus, who had for a long time drunk considerable amounts of beer, and examination of whose blood, in cover-glass preparations treated with osmic acid, disclosed the presence of large quantities of fat. The dried and fixed cover-glass preparations were for twenty-four hours exposed to the action of 1 per cent. osmic acid, then carefully washed, and finally stained with eosin. The specific gravity of the blood was 1036. The red corpuscles numbered 3,300,000, the colorless corpuscles 125,000, to the cubic millimetre. The red corpuscles presented no abnormality and the colorless cells little fatty change, the latter being mostly multinuclear and neutrophile. This may be considerably increased after the ingestion of large amounts of fat. Even under normal conditions the blood contains a small proportion of fat. Among the conditions in which fat appears in excess in the blood are pulmonary tuberculosis, nephritis, diabetes, dyspnœa, poisoning with carbon monoxide, menstrual suppression, pregnancy, obesity, jaundice,

high fever, typhus, malaria, inflammation of the spleen, cholera, and alcoholism. The symptoms attendant upon the presence of excessive amounts of fat in the blood are not distinctive. The condition is usually associated with other disease. A common feature is dyspnoea, indicating a deficiency in respiratory oxygenation, with attendant languor and vertigo. The condition is of itself not dangerous, usually disappearing spontaneously in the course of about ten days. Therapeutically, there is virtually nothing to be done but the correction of the condition to which the lipæmia is to be ascribed.

A FATAL CASE OF CHRONIC STOMATITIS.

WINKELMANN (*Deut. Zeitschr. f. Chir.*, Bd. xxxix., H. 1, 2, p. 117) has reported the case of a man, forty-six years old, who presented an inflammation of the right half of the tongue, attended with the presence of vesicles. The use of antiseptic mouth-washes was followed by rupture of the vesicles and the formation of small ulcers. Potassium iodide was faithfully administered without success. As it was thought that possibly the ulcers resulted from irritation and pressure exerted by the teeth, these were removed, but the condition still failed to improve. At a later date an ulcer formed at the right angle of the mouth, extending to the lower lip and inner surface of the cheek. Its margins were flat, its base not hard, and it bled easily on touch. The mucous membrane of the right cheek was thrown into folds in the intervals between which were numerous small ulcers covered with a whitish deposit. The submaxillary and cervical glands were not enlarged. The odor of the breath was rather sweetish and sour, and not putrid. The urine contained neither albumin nor sugar. Cultures made from material obtained from some of the ulcers gave rise to the development of a form of fungus resembling the mould of wine, and cultivable upon almost all media. There were also some colonies of *staphylococcus pyogenes aureus*. The ulcerative process gradually extended into the pharynx and larynx; diarrhoea set in, bronchitis with fever developed, and death took place amid the manifestations of asthenia. A post-mortem examination was not permitted. The fungus found was believed to belong to the class of budding fungi that do not cause fermentation of grape-sugar. Inoculations of lower animals were negative, so that it could not be demonstrated that the fungus was responsible for the malignant affection, although the other evidence supported this view.

THE LOCALIZATION OF THE REFLEXES.

JENDRASSIK (*Deutsches Archiv f. klinische Medizin*, Bd. lii., H. 5, 6, p. 569) classifies the reflexes into three groups. In the first he includes (a) physiologic spinal reflexes (the deep reflexes); (b) pathologic spinal reflexes; (c) vasomotor reflexes. Among physiologic spinal reflexes he includes tendon-reflexes, muscle-reflexes, periosteal-reflexes, bone-reflexes, joint-reflexes and the bulbo-cavernous reflex. They have in common the following characteristics. They may be induced from points of slight sensibility. The reflex act is not attended with a specific sensation. It results from simple mechanical irritation, as from a blow. The intensity of the induced movement depends somewhat upon the individuality of the subject, but not to the same degree as in

the second group. Other things being equal, the result is proportionate to the intensity of the stimulus. (As a rule, persons in whom the reflexes of this group are well developed, display those of the second group in a slighter degree.) The reflex act can be induced by the examiner in himself as well as in others. The period of latency is exceedingly short. The resulting movement is a simple one, and obviously purposive. These reflexes are increased by active muscular activity. In case of cerebral palsy (after the lapse of a certain time) these reflexes are exaggerated. Retardation is not observable. Psychic influences are without effect upon them (although removal of attention makes them more ready of occurrence). The only pathologic spinal reflex named is the movement of flexion, more rarely of extension, of the lower extremities, known as the pseudo-knee phenomenon. It may be induced from any point of the affected part, even from the cutaneous surface. It occurs without subjective sensation. It may result from pinching, pricking, and other irritations, particularly if long continued. The effect depends upon the duration of the irritation. The period of latency is rather long, but not always alike. The movement is always the same, and affects the entire extremity in regular sequence wherever the irrigation may be applied. This reflex occurs only when the cord has been completely divided. It is not affected by psychic influences. Of vasomotor reflexes only the contraction and dilatation of the vessels and contraction and dilatation of the pupils are mentioned. The reflexes of the second group are designated cerebral (cutaneous) reflexes. They include the scapular, the abdominal, the cremasteric, the scrotal, the plantar, the auditory (the ear), the orbicular, the palatal, the conjunctival, and the anal. They possess in common the following characters: They are induced from sensitive points, particularly those that are not accustomed to contact with other bodies (as for instance in tickling). The occurrence of the act is preceded by some sensation, such as of a prick, of cold, of tickling, etc. The object of the irritation is to arouse a definite sensation; and the exposure must be longer than in the first group of reflexes. Slight contact often brings about a more active result than energetic contact. Individuality plays an important part in the result. These reflexes are scarcely, if at all, to be induced by the observer in himself. The period of latency is longer than in the first group, but not so constant. It depends upon the period of recognition and corresponds to the reaction-time. The resultant movement is simple, but its main character is the avoidance of the irritation. Increased muscular activity does not increase the effect, but, on the contrary, at times prevents the reflex. This is diminished in cases of cerebral palsy. If sensation is retarded this reflex is also. It may be diminished by psychic influences, though it may be thus increased (removal of attention diminishes the reflex). In the third group of reflexes are included those that are related to special centres, and are complex. Among them are the nasal (sneezing), the uvular (vomiting), the œsophageal (deglutition), the laryngeal (coughing), the vesical (micturition), the rectal (defecation), the genital (ejaculation). They possess the following characters: They are induced from sensitive areas. The act is preceded by a specific sensation, which plays a still more important part than in the reflexes of the second group. The production of the act requires the most protracted irritation. The individuality is of great influence upon the result. The reflex may be induced by the observer in himself, but there are specific

irritations. The period of latency is long. The resulting movement is very complicated and bilateral. Several muscle-groups, in some instances even antagonistic muscle-groups, take part in the act. Muscular activity somewhat diminishes the reflex. In case of cerebral affections the reflex is either increased or diminished. Psychic influences have considerable importance in the production of the act. The reflexes of this group belong to the vegetative functions.

A CASE OF ADDISON'S DISEASE IN A GIRL THIRTEEN YEARS OLD.

DYSON (*Quarterly Medical Journal*, vol. iii., Part I., p. 43) has reported the case of a girl, thirteen years old, who, it is said, was quite well until three months before coming under observation, although for three months previously to the supervention of her illness her mother had noticed the skin growing darker. The illness set in gradually, with complaint of fatigue and depression, headache, tearing and dragging pains on both sides of the body and back and occasional nausea. The weakness was gradually progressive, and to the other symptoms there were added faintness and dyspnœa on the slightest exertion, palpitation, increasing nausea, and discoloration of the skin. There was a strong family history of tuberculosis. The child was of average height, well developed, somewhat spare, though not emaciated, and somewhat pale and anæmic, with discoloration of the skin. She appeared drowsy, languid, and depressed. The temperature was normal. On the lips, at the junction of the mucous membrane with the skin, there was a bluish-black line, the better marked on the lower lip. On the mucous membrane of the inner surface of the lips and of the gums were irregular patches of a similar color. There were also small black spots on the edges of the tongue, which was small and pointed. The appetite was poor. Vomiting took place two or three times a day, the vomited matters being fluid, dark, and bile-colored. Nausea and retching were frequent. The bowels were regular. The abdomen presented a dark-brown line, corresponding to the linea alba and was a little distended. There were some pain and tenderness in the hypochondria, especially on the left. No tumor was detectable. The blood was slightly deficient in coloring matter and contained a slight excess of colorless corpuscles. The heart-sounds were feeble and scarcely perceptible. The pulse varied from 90 to 120 per minute, and was small and feeble. The skin of the body generally was of a yellowish-brown color, the hands, neck, and face; the parts naturally pigmented, namely, the areolæ of the breasts, the umbilicus, the axillæ, and the thighs, the seats of pressure, namely, above the knees where the garters were tied, and below the knees (probably from kneeling), and around the ankles where the boot laces were tied; and the linea alba were very deeply pigmented and of a blackish-brown color; the darker parts gradually faded into the lighter-brown parts; in the darker parts were small black specks. The skin was moist and cold. The urine presented no abnormality. Menstruation had not occurred. The memory was defective. There was depression of spirits, and the child was semi comatose. The reflexes and sensibility were normal. There was a slight lateral curvature of the spine. The symptoms became progressively aggravated, the headaches more severe, the asthenia more marked, and the vomiting more constant and uncontrollable, while the coma increased.

Finally, the patient had several convulsive seizures in quick succession, each lasting a few seconds, and during which the eyes and jaws were fixed, the extremities rigid, and consciousness completely lost, the patient afterward relapsing into the semi-comatose condition. At intervals the child had attacks in which she shrieked loudly, looked terrified, and tossed herself about in bed and grasped at anything or anyone near her. These attacks lasted for a few minutes, after which she became extremely exhausted, and relapsed into a comatose condition. They became more and more frequent and lasted longer, until finally death ensued. The treatment consisted of the administration of agents to relieve the nausea and combat the asthenia, and such diet as the stomach would be likely to tolerate. A tincture of suprarenal gland was obtained as soon as possible, but the few doses it was possible to administer afforded no basis for an opinion as to its efficacy.

Upon post-mortem examination the mucous membrane of the stomach and bowels was pigmented, in some parts more than others. Peyer's patches were enlarged, swollen, and deeply pigmented. The veins from all the abdominal viscera were dilated and full of fluid blood; the left renal vein was especially large. The mesenteric glands slightly enlarged; one exhibited caseous changes. Irregular patches of pigment were seen on the walls of the vagina. The suprarenal bodies were decidedly enlarged, the left much more so than the right. The left weighed 160 grains, and was two and a half inches long, and three-quarters of an inch in thickness; the right weighed 96 grains. Both were very hard and firm in consistence, and had an irregular, nodular, yellowish-colored surface. On section both presented precisely similar changes; the glands were very hard and fibrous, with here and there cretaceous nodules, some of which were surrounded by softer, more caseous material; both organs were adherent to neighboring structures. The gray, gelatinous substance and the greenish puriform material so frequently seen were absent. Microscopic examination confirmed the existence of fibroid changes.

FATAL VOMITING WITHOUT DISCOVERABLE CAUSE.

VICKERY (*Boston Medical and Surgical Journal*, vol. cxxxi., No. 13, p. 314) has reported the case of a man, thirty-eight years old, who three months before coming under observation complained of listlessness and fatigue. He lost some ten pounds in weight, and began the use of a nostrum believed to contain potassium iodide. While pursuing this plan of treatment some weight was regained, but a certain puffiness about the neck and face appeared. While engaged in repairing a burst steam-pipe the man became nauseated, and evacuated the contents of his stomach. For some days thereafter he did not feel badly in any way, except that his stomach was unable to retain food. There were considerable retching and vomiting, but the temperature was normal. The face appeared to be somewhat bloated and flushed, and the conjunctivæ were injected. The vomiting was for a time relieved, but soon returned. The right pupil was much dilated, but at a later date became normal, and the left dilated. Headache was a source of considerable annoyance. The urine at no time contained albumin. Rectal alimentation was employed, but in spite of all endeavors the patient died of exhaustion. On

post-mortem examination the only abnormality detected was dilatation of the stomach with some thickening of its walls. The only explanation suggested is that the symptoms might have been due to the potassium iodide taken.

THE BACTERICIDAL ACTIVITY OF BLOOD-SERUM.

PANSINI and CALABRESE (*Centralb. f. Bakteriologie u. Parasit.*, Bd. xvi. No. 10, 11, p. 458) undertook an experimental study to determine what changes took place in the bactericidal activity of the blood-serum if the changes that take place in various morbid processes, such as gout and diabetes, are as nearly as possible artificially duplicated in the laboratory; the influence of the addition of small quantities of quinine approximately corresponding to that present in the blood after the administration of large doses of this drug; and in the case of a positive result to determine if it were possible by means of large doses of quinine to neutralize infection by pneumonia cocci, or at least to inhibit the development of these organisms.

The experiments show that the presence of grape sugar diminishes the bactericidal activity of blood-serum, and thus suggest an explanation of the virulent course of certain chronic infections, such as tuberculosis, or certain acute infections, such as pneumonia and surgical infection in cases of diabetes. It was further found that the addition of uric acid diminishes the bactericidal activity of the blood-serum. This may explain the susceptibility of persons of the uric-acid diathesis to such complications as pneumonia, meningitis, pleuritis, and nephritis. The addition of quinine in such quantities as would represent the proportion found in the blood after the administration of large doses was found to increase the bactericidal activity of the serum. Experimental observations upon a large number of mice inoculated with the diplococcus pneumoniae showed that the injection of quinine in large doses exercised a curative effect. The results were less successful in the cases of rabbits, guinea-pigs, and dogs.

PREMONITORY SYMPTOMS OF HEPATIC CIRRHOSIS.

HANOT (*Revue gén. de Clinique et de Thérap.*, No. 25, p. 294) points out that among the early signs of incipient cirrhosis of the liver are dyspeptic disorders. The appetite is impaired, digestion is difficult, tympanitis appears after eating, emaciation occurs, strength fails, and prostration develops. Vomiting is present, and resembles that due to alcoholism. Among the intestinal disorders, meteorism is most prominent. It is usually accompanied by obstinate constipation, sometimes alternating with attacks of diarrhoea. The biliary secretion is notably interfered with. Sometimes there occurs a pigmentary acholia, with discoloration of the fecal matters not due to the absence of bile, but to the resorption of biliary pigment and its elimination in the urine. This acholia is exceptional. Urobilinuria is the rule. This is due to an insufficiency of the hepatic function, as a result of which the hemoglobin of the blood is transformed into urobilin, and not into bilirubin. Thus the conjunctiva becomes icteric, and biliary pigment is absent from the urine, which yields the spectroscopic reactions of urobilin. Alimentary glycosuria is not uncommon. The liver fails to transform into glycogen all of the saccharine or amylaceous alimentary matter. Among the early signs of cirrhosis

is a white œdema, which is intermittent and precedes ascites. The skin is glossy and tense, and retains the impress of the finger. It is present upon the extremities and over the liver. Among other symptoms present are pruritus, hemorrhoids, a tendency to hemorrhage, purpura, and hepatalgia. The symptoms are ascribed to an insufficiency of the hepatic function and the suspension of the antitoxic activity of the liver. From this fact a milk diet is indicated, together with abstinence from alcohol and the administration of antiseptics. Of the last salol may be given in daily doses of one or two grammes, and calomel in daily doses of a centigramme.

IMMUNITY TO DIPHTHERIA.

As the result of an experimental study, KUPRIANOW (*Centralbl. f. Bakteriologie u. Parasit.*, Bd. xvi., No. 10, 11, p. 415) arrives at the conclusion that the blood-serum of rats, which are naturally immune to diphtheria, is not capable of protecting other animals from diphtheria, although the treatment of rabbits with virulent, living cultures of diphtheria bacilli confers immunizing qualities upon the blood-serum. This may be brought about by the use of progressively increasing doses of bouillon-cultures of diphtheria-bacilli, either in small, daily doses (0.1 c. cm.), or weekly, larger doses (1 c. cm.), or doses increased from week to week. By means of the blood-serum of such immunized rats and of injection of bouillon-cultures of diphtheria-bacilli in increased doses three or four weeks after the injections of serum a high degree of immunity may be conferred in a comparatively short time (three months) upon guinea-pigs. By the use of the blood-serum of such highly-immunized guinea-pigs a high degree of immunity may be conferred in a shorter time upon other guinea-pigs. The procedure of immunization forcée to diphtheria is not applicable to guinea-pigs. Active immunity does not develop in animals immunized by means of blood-serum earlier than three or four weeks after the first injection of a bouillon-culture of diphtheria-bacilli for the purpose of testing the existence of passive immunity, and then only in mild degree. In order to attain a high degree of immunity the treatment must be begun with minimal lethal doses of bouillon-cultures of the diphtheria-bacillus, the dose being at first gradually increased, as the animals are at the outset peculiarly susceptible. Subsequently the doses of living cultures may be rapidly increased without danger. The feeding for a protracted time to dogs of guinea-pigs dead of diphtheria has no influence upon the development of immunity, even when conjoined with treatment by means of heated cultures. The maximum degree of immunity attainable seems to vary with the species of animal experimented with. The immunizing power of the serum of immunized rabbits is slighter than that of guinea-pigs, and that of guinea-pigs slighter than that of dogs.

A CASE OF GASTRITIS GRAVIS.

ROSENHEIM (*Berliner klin. Woch.*, 1894, No. 39, p. 887) has reported the case of a woman, fifty-eight years old, previously in good health, who ten weeks before coming under observation complained of headache and anorexia, and subsequently of vomiting. In the course of two weeks exhaustion was so marked that the woman was compelled to take to bed. The headache,

which was principally confined to the forehead and temples, was accompanied with shooting pains in the muscles of the upper and lower extremities. At times there was also enuresis. Speech became slow and difficult, and after four weeks troublesome dyspnœa and palpitation of the heart made their appearance; emaciation had been progressive. On palpation a sense of resistance was perceived in the abdomen in the region corresponding with the pylorus, together with some sensitiveness. The stomach was displaced and dilated. The motor activity was obviously enfeebled. The urine contained no albumin; the eye-grounds were normal. Despite careful dietetic management the vomiting persisted; the gastric contents emitted a disagreeable odor, but contained no sarcinæ and no free hydrochloric acid, although lactic acid was present. There was from time to time slight elevation of temperature, with acceleration of pulse. Examination failed to disclose obstruction of the œsophagus. Later in the history of the case a trace of albumin appeared in the urine, but tube-casts could not be found. There was no œdema. Emaciation progressed and the vital forces failed until death ensued, some four months after the appearance of the first symptom.

A diagnosis of carcinoma of the pylorus was made, which upon post-mortem examination was proved to be fallacious. The stomach was markedly dilated, its mucous membrane pale and gray. The pylorus permitted the passage of a finger, but its walls were unduly thickened. This thickening was found to depend upon an increase in the muscular layer. Macroscopically the mucosa at the pylorus presented no appreciable change, but at the fundus, particularly at the cardia, it appeared smooth and thin. On microscopic examination the muscularis of the pylorus was found to be increased in volume, and here and there the seat of infiltration. The walls of the vessels of the submucosa were thickened, and the muscularis mucosa was in places the seat of infiltration. The mucosa proper presented a condition of marked interstitial hyperplasia, leading to compression of the glandular structure, which had undergone degenerative and atrophic changes. The morbid process was less marked at the fundus. The wall of the cardiac portion of the stomach was thinnest and the mucosa strikingly attenuated. In this situation glandular structure was entirely wanting.

DIPHThERIA AND PSEUDO-DIPHThERIA.

In a report to the Director of the Bacteriological Laboratory of the Health Department of New York City, PARK and BEEBE (*Medical Record*, vol. xlv. No. 1247, p. 1) detail the results of bacteriological examinations made in 5611 cases of suspected diphtheria in the course of twelve months. In 3255 (about 58 per cent.) of these diphtheria-bacilli were found to be present; in 1540 (about 27 per cent.) no diphtheria-bacilli were found; while in 816 cases (15 per cent.), although no bacilli were found the cases were for various reasons considered to be of doubtful nature, although they were probably not examples of diphtheria. In a large percentage of the cases of true diphtheria the sex was given, and of these 54 per cent. were in females and 46 per cent. in males. The ages of the persons attacked ranged between three weeks and seventy years. The number of cases increased with each twelve months of life up to the fourth year, and then gradually diminished. The

mortality was! 27 $\frac{3}{4}$ per cent.; it was highest in the first two years of life, and then steadily diminished until adult life was reached, when it again slowly increased. Scarlet fever was associated with diphtheria in about five in every thousand cases. 450 of the non-diphtheritic cases were carefully investigated. Among these there were 11 deaths, about 2 $\frac{1}{2}$ per cent.; 42 were complicated by scarlet fever, and of these four died. In six measles occurred as a complication; all recovered. Two deaths occurred among adults in this group, one a man of seventy with valvular disease of the heart; the other a young female who died of septicæmia. Five deaths occurred in uncomplicated cases of pseudo-pneumonia in children under five years of age. In these the larynx was affected. In three cases broncho-pneumonia developed as a complication. In 286 of the whole number of cases examined the disease was entirely or chiefly confined to the larynx and bronchi, and of these 283 were in children. In 229 of the 286 characteristic bacilli were found. Of this number 167 showed no pseudo-membrane or exudate above the larynx, while in the remaining 62, although the larynx was mainly involved, some membrane or exudate was also present on the tonsils or in the pharynx. In 57 of the 286 cases no diphtheria-bacilli were found, but in 17 of these the cultures were unsatisfactory. In 27 of the remaining 40 cases the disease was confined to the larynx or bronchi, while in 13 more or less exudate or membrane was present on the tonsils or in the pharynx.

Of 605 consecutive cases in which recovery ensued diphtheria-bacilli could no longer be found in the throat within three days after the complete disappearance of the exudate in 304. In 176 cases the bacilli persisted for seven days; in 64 for twelve days; in 36 for fifteen days; in 12 for three weeks; in 4 for four weeks; in 4 for five weeks, and in 2 for nine weeks.

It was found that children, and to a less extent adults who are brought in contact with true cases of diphtheria, often have diphtheria-bacilli in their throats, and these bacilli may persist and develop for days or weeks. In some cases true diphtheria followed the development of these bacilli in the respiratory tract, while in others no disease developed. The examination of the throats of 330 healthy persons revealed the presence of virulent bacilli in but eight persons, two of whom later developed diphtheria.

The following deductions are made:

All inflammations of the mucous membranes due to diphtheria-bacillus should be included under the name diphtheria. An acute hyperæmia of the mucous membrane caused by diphtheria-bacilli is as truly diphtheria as an inflammation with pseudo-membrane or exudate, and a case in which the lesions are confined to the larynx or bronchi as truly one of diphtheria as a case in which the tonsils and pharynx are involved.

Under pseudo-diphtheria should be included all inflammations of the mucous membranes which simulate true diphtheria, and which are due to streptococci, or, more rarely, other cocci.

The name croup, or membranous croup, should be regarded as merely indicating that the location of the pseudo-membranous or exudative lesion is in the larynx, and not as describing the nature of the disease, whether diphtheric or pseudo-diphtheric.

At a time when diphtheria is prevalent virulent diphtheria-bacilli are found in a small proportion of healthy throats in persons that have been in

direct contact with cases of diphtheria. Many of these, however, do not develop diphtheria. The members of a household in which a case of diphtheria exists should thus be regarded as sources of danger, unless cultures from their throats show the absence of virulent diphtheria-bacilli.

All bacilli that are identical, morphologically, biologically, and in staining reactions, with virulent diphtheria-bacilli, should be classed with these, whether they display much, little, or no virulence in inoculated guinea-pigs. Bacilli that have entirely lost their virulence, rarely, if ever, regain it, and are probably incapable of causing diphtheria.

The name pseudo-diphtheria bacillus should be regarded as applying to those bacilli found in the throat which, though resembling diphtheria-bacilli in many respects, yet differ constantly in others equally important. These bacilli are rather short, and are more uniform in size and shape than typical diphtheria bacilli. They stain equally throughout with the alkaline methylene-blue solution, and produce alkali in their growths in bouillon. They are found in about one per cent. of healthy throats in New York City, and seem to have no connection with diphtheria. They never display virulence.

One or more varieties both of streptococci and of other forms of cocci exist in the great majority of healthy throats in New York City, and possibly in all. Cultures from the throat in cases of pseudo-diphtheria contain more cocci, especially more streptococci, than those from healthy throats, but otherwise do not seem to differ.

It was demonstrated that many of the less characteristic cases of diphtheria and pseudo-diphtheria are so similar in appearance, symptoms, and duration; that it is impossible to separate them, except by bacteriological examination. In the more severe cases, and after the disease has fully developed, cultures are less necessary, although their systematic use is desirable.

Persons who have suffered from diphtheria should be kept isolated until cultures prove that the bacilli are no longer present in the throat, for not only are the bacilli that persist in the throat virulent, but they are not infrequently the cause of diphtheria in others. When cultures cannot be made, isolation should be continued for at least three weeks after the disappearance of the membrane, for experience has shown that it is not unusual for the bacilli to persist for that length of time.

In pharyngeal cases in which thorough irrigation of the nostrils and throat with a 1 : 4000 solution of mercuric chloride was practised every few hours the bacilli were not found in the throat for so long a time after the complete disappearance of the pseudo-membrane as when no antiseptic was employed. Other antiseptic and cleansing solutions may be also useful.

Inflammations of the mucous membranes due to streptococci, either alone or associated with other cocci, are usually mild in character. These inflammations may be more serious when the lesion is located in the larynx or when they are complicated by scarlet fever or measles.

While the streptococci, and perhaps other forms of cocci, may be considered as the primary etiologic factor in pseudo-diphtheria, yet, in the majority of cases at least, certain predisposing factors, such as exposure to cold or other deleterious influences, or the existence of certain infectious diseases, appear to be of great importance in determining the occurrence of the disease.

The streptococci which under these conditions apparently cause the disease are probably those which had for a long time been present in the throat, and not those freshly derived through communication with other cases of pseudo-diphtheria. In a small number of cases, indeed, the histories suggest a direct communication, but the causation may be equally well explained by the supposition that the second case shared with the original one the same predisposing cause.

The slight mortality and the usual mildness of the cases of pseudo-diphtheria do not warrant the enforcement of isolation, even if further investigation should furnish positive proof that this condition is directly communicable.

SURGERY.

UNDER THE CHARGE OF

J. WILLIAM WHITE, M.D.,

PROFESSOR OF CLINICAL SURGERY IN THE UNIVERSITY OF PENNSYLVANIA; SURGEON TO THE
UNIVERSITY AND GERMAN HOSPITALS;

ASSISTED BY

<p>ALFRED C. WOOD, M.D., INSTRUCTOR IN CLINICAL SURGERY, UNIVERSITY OF PENNSYLVANIA; ASSISTANT SURGEON, UNIVERSITY HOSPITAL.</p>	<p>AND C. L. LEONARD, M.D., ASSISTANT INSTRUCTOR IN CLINICAL SUR- GERY IN THE UNIVERSITY OF PENNSYLVANIA.</p>
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TWO CASES OF INTRA-PERITONEAL RUPTURE OF THE BLADDER.

COATS records (*British Medical Journal*, 1894, No. 1751) two fatal cases of rupture of the urinary bladder, and adds the post-mortem records. In studying these cases the following points seemed especially worthy of comment:

The absence of a clinical diagnosis in both. There was no clear history of violence in either case, and the symptoms were obscured by the fact that one patient was maniacal and the other deeply intoxicated.

The seat and size of the rupture were similar in the two cases. The tear was found in the posterior wall of the bladder, a short distance from the fundus, being circular in the first case and transverse in the second.

The interval of time between the rupture and the death of the patient was in the first instance five days, and two to three days in the last. Of 85 cases collected by Rivington, 8 died within twenty-four hours; 15, within two days; 15, within three days; 16, within four days; 10, within five days; 4, within six days; 5, within seven days; 5, within eight days; 1, within nine days; whilst 1 lived twelve days; 1, more than twelve days; 1, fourteen days; 2, about fifteen days; and 1, sixteen clear days.

The absence of peritonitis was a surprise to the author, who states that none of the ordinary evidences of acute peritonitis were present.

Absence of inflammatory reaction in the wound was noted, particularly in the first case, even in the microscopic examination of the edge of the wound and adjacent bladder wall. Ferraton, in 1883, recorded two cases that received

external wounds simultaneously with rupture of the bladder; he observed that at the time of death the wounds presented exactly the same aspect as at the time of admission to the hospital—"they presented no trace of a process of inflammation and repair."

The mode of death is directly related, in the opinion of the author, to the absorption of urine by the peritoneum, and its continuous accumulation in the blood, to which condition Coats applies the term "urinary poisoning."

MODIFICATIONS OF BIGELOW'S OPERATION FOR STONE IN THE BLADDER,
DESIGNED TO MEET CASES IN WHICH THE PROSTATE IS ENLARGED.

CHISMORE, after speaking of the difficulties attending litholapaxy in the presence of senile hypertrophy of the prostate gland (*Journal of Cutaneous and Genito-urinary Diseases*, 1894, vol. xii.), propounds the following questions: Is it worth while to attempt to remove stone by crushing? Can it be done with sufficient safety, celerity, and certainty to warrant a trial? If so, how shall we proceed in order to minimize the danger and suffering to our patients?

The author's experience has led him to answer the first two queries in the affirmative, and offers the following modifications of the classical operation as a solution of the last:

1. Substituting local for general anæsthesia in cases in which an anæsthetic is required.

2. Short sittings. Continue crushing only as long as fragments can easily be found. Wash out the pieces, and stop the moment symptoms of exhaustion, spasm of the bladder, or unusual distress occur.

3. Remove remaining pieces, after symptoms due to previous operation have subsided, as soon as they can be felt by the searcher—usually within a week—and repeat the process until the bladder is cleared.

If stricture is present gradual dilatation is employed until the calibre is sufficient to admit the necessary instruments, when, at the first favorable opportunity, Chismore draws off the urine with a catheter, injects one or two fluidounces of solution of cocaine hydrochlorate, and proceeds at once to crush the stone. This he does in his office. No prolonged attempt is made to entirely free the bladder, but those fragments only which can be quickly grasped are crushed and removed in the usual manner. If any portion remains, the old symptoms soon recur, and the operation is repeated in the same way, except that frequently no anæsthetic will be required.

Chismore has devised a lithotrite and evacuator combined, which he prefers in all cases in which the stone is not too hard.

A summary of fifty-two cases coming under the above heading is given.

The personal experience of the author leads him to the following conclusions: In all cases of stone in the bladder where senile enlargement of the prostate gland exists, the operation described affords a reasonable probability of success, provided the urethra is or can be made large enough to admit the instruments; that, in such cases, it is possible by this method, with less suffering and danger to the patient, to remove any stone that can be gotten through a perineal incision; that the results are quite as good, both as to relief or recurrence, as those attained by cutting—either "high" or "low"

—and that, as a rule, the time required to clear the bladder is not greater than that which is necessary to recover from a suprapubic lithotomy.

PERSISTENT ŒDEMA AND ELEPHANTIASIS FOLLOWING EXTIRPATION OF LYMPHATIC GLANDS.

RIEDEL calls attention (*Archives für klinische Chirurgie*, 1894, Band xlvii., Heft. 3 u 4) to the infrequency of reports of persistent œdema or elephantiasis following removal of lymphatic glands. He believes that the cases occur with greater frequency than would be indicated by literature, as he has himself met with three instances. The first patient was a boy, twelve years of age, who suffered from œdema of the entire arm and hand three years after extirpation of the axillary glands. The second case was that of a man with suppurating sinuses, the result of chancroidal buboes, for the relief of which Riedel excised the inguinal glands on both sides. Two years later the patient presented a mild degree of elephantiasis of both thighs and of the lower part of the trunk. In the third instance the inguinal glands of the left side were removed for the same condition as existed in the previous case, and six months later elephantiasis of the skin of the corresponding thigh was apparent. In the last two cases the changes in the skin were associated with attacks resembling erysipelas. In view of these results the author questions the advisability of completely removing the glands in these cases.

AN ADDITION TO PRESENT METHODS OF CLOSING LARGE CONGENITAL FISSURES OF THE HARD PALATE.

MILTON (*Lancet*, July 14, 1894) reports a case of severe double hare-lip and cleft palate in which he supports the theory of insufficient approximation as the chief factor in the production of the deformity by the following points: (1) the separation between the two halves of the bifid uvula largely exceeded the width of any possible undivided organ; (2) the upper teeth overlapped the under teeth laterally to the extent of three lines on either side; (3) the upper canines coincided when the jaws were closed with the first lower premolars; (4) the expansion of the *alæ nasi* was one and three quarter times as great as in a normal child of the same stature; and (5) the alveolar process of the inter-maxillary bone projected four lines beyond that of the lower jaw and lay two lines higher than those of the superior maxilla. Convinced that the deformity was due to insufficient approximation, the author grasped the two superior maxillæ with a strong pair of forceps shaped somewhat like lion forceps, and with very considerable pressure, exerted with great care, at once brought together the two maxillæ along the greater portion of the fissure, the only obstacle being the interposed septum nasi. The snout was then forced down to take up its position between the two maxillæ. The sides were held in their approximated position by a wire passed in the groove between the teeth and the gums and across from behind the last premolar on one side to the last on the other, and then tightened by twisting in front. The patient had no reaction after this operation, and wore the wire comfortably for thirty-eight days. The bones retained their new position after its removal, and a plastic operation of the soft parts easily completed the restora-

tion. The author feels justified only in expressing the following opinions on the strength of this one case: (1) That in some cases of fissure of the hard palate, especially, perhaps, in those in which the fissure is complete, the non-approximation of the two maxillæ may be an important factor in the production of the gap. (2) That in such cases the approximation of the separated portions by forcible pressure may be possible. Such approximation is very simple in performance, is not likely to be harmful in its results, and may greatly facilitate the subsequent operation for complete union of the soft parts. (3) It remains to be seen whether the forcible manipulation of the jaw is disadvantageous to its future development, and it may be that in some cases the approximation may entail so much deformity in the jaws as to greatly discount its advantages.

AN IMPROVED ASEPTIC TREPHINE.

A NEW mechanical device for operating with greater rapidity and efficiency the ordinary Galts trephine, is described by LEONARD (*Annals of Surg.*, May, 1894). "It consists of a fixed handle, in which revolves a shaft to which the force is applied through a double-raised spiral by means of a sliding handle." "This improvement in the application of the power and the rapidity of cutting will be more easily realized when it is considered that one motion of the hand with the old model produced but one-half of a revolution, while by this method three complete revolutions are made in the same amount of time and with less effort." "The simplicity of the mechanism makes it well nigh impossible for this instrument to get out of order, while the aseptic construction and easy separation facilitate cleansing." "In no case is great force required, as the trephine, depending for its cutting power on the rapidity of its revolution, cuts most rapidly when lightly applied. It should be borne in mind that it cuts much more rapidly than the ordinary trephine, and the depth of the cut should be more frequently ascertained." The mechanism applies power equally well to bone-drills and burrs. The perfect aseptic construction and the lightness of the instrument, less than fifteen ounces, make it very convenient and portable.

SUPRAPUBIC PROSTATECTOMY.

ROBSON (*Brit. Med. Journ.*, July 14, 1894) reports twelve cases of operation by this method. He considers this operation in properly selected cases one attended with less danger than is usually thought, and that if thoroughly and completely performed it is capable of affording such relief as may be in many instances genuinely termed a cure, and that in a class of cases which until a few years ago were looked on as incurable. As a method of diagnosis he strongly recommends bimanual examination. In regard to the selection of cases, whenever a patient has no large amount of residual urine, and can be made comfortable by the passage of a catheter at night or night and morning, and where catheterism is well borne and not difficult or distressing, operative treatment is unnecessary. In complete muscular atony, operation is advisable if the atony have existed only a short time; months' duration precludes successful operation. The presence of a large amount of residual

urine associated with fair vesical contractility, and not diminishing after regular catheterism, if the patient is in fair condition and is not sufficiently relieved, is a decided indication for prostatectomy. Cystitis associated with pain and irritation during catheterism is an indication for the operation, as is also the presence of calculi or calculous material. Contraindications are, advanced kidney disease, especially associated with greatly diminished secretion of urea; chronic atony; glycosuria; well-marked degeneration of the bloodvessels associated with general senile debility or other organic disease that would render any major operation unwise. In addition to external antiseptics and washing the bladder out with boric solution, the author advises five to ten grains of boric acid and a little saccharin thrice daily for a few days before the operation, so as to render the urine aseptic if possible. He introduces at most only four to six ounces into the rectal bag, in order not to over-distend the rectum and cause rupture or inflammation. The bladder is filled with boric lotion till it is felt above the pubes; the peritoneum can usually be avoided; but when it must be cut into it should be dissected up and sutured before the bladder is opened. McGill's scissors or Jessop's cutting ring-forceps are used to remove the portion of prostate desired. Suprapubic drainage has been found sufficient in all cases. In the after-treatment boric acid is given thrice daily, and the bladder is washed out by syringing a solution of boric acid through the urethra to the drainage opening. The drainage-tube is removed on the third day, if possible, and the patient is allowed to sit up within a few days after the operation. Recovery follows without general disturbance.

DISEASES OF THE LARYNX AND CONTIGUOUS STRUCTURES.

UNDER THE CHARGE OF

J. SOLIS-COHEN, M.D.,
OF PHILADELPHIA.

RECURRENT PELLICULOUS SORE-THROAT.

UNDER the heading "Pseudo-diphtheria or False Membrane of the Throat," DR. GEORGE B. WHITE, of Dublin, reports (*Journal of Laryngology, etc.*, No. 12) a case of recurrence of membrane of more than two years' duration in a lady under the care of Sir Philip Smyly.

A yellowish membrane becomes formed upon portions of the tonsils, upon the uvula and upon half of both surfaces of the soft palate; the parts immediately around looking red, vascular, and slightly cedematous. The membrane can be peeled off in mass without hemorrhage, and the exposed surface becomes healthy and normal within two days. Similar membrane becomes formed upon apparently healthy surfaces at intervals of from fourteen days to two months, the process being completed within say twenty-four hours.

Microscopic investigation of this membrane reveals small nucleated cells in lymph, fibrin fibrils, rod bacteria, coin, epithelium, hæmoglobin, and two forms of fungus spores, one corresponding in character to the sacch. cerevisiæ, and the other to the actinomyces. Antiparasitic remedies have had but little influence in arresting recurrence, which has not been so frequently in the pharynx latterly, while its tendency is manifested to spread toward the tongue.

MALIGNANT STRICTURE OF THE OESOPHAGUS HIGH UP.

SIR PHILIP SMYLY, of Dublin, reports (*Journal of Laryngology, etc.*, No. 12) an instance in a middle-aged female at a point immediately below and behind the cricoid cartilage.

A NASAL POLYP.

RITTER (*Deutsche Monats. f. Zahnheilk.*, June) reports that a nasal polyp which extended into the antrum of a man twenty-three years of age has been diagnosticated as a sarcoma of the upper jaw, and its true nature was revealed upon opening the antrum.

INFLUENZA.

DR. MORTIMER GRANVILLE (*Medical Press and Circular*, No. 24) believes influenza to be a Chinese marsh fever, the essential lesion of which is a broncho-pneumonia. He would call it "epidemic lobular pneumonia," rather than influenza, as indicative of its constant and pathognomonic morbid features. He believes that the best treatment is found in administering a combination of camphor and iodine as follows: R. Camphoræ, grs. lx; Tr. iodi (codex), ℥℥x; mucilaginis acaciæ, fʒiv; glycerini, fʒvi; olei menthæ piperitæ, ℥vj; syrupi zingiberis, ad fʒiij. Dose, two teaspoonfuls every second or third hour. These views he learned in 1848.

The treatment must be tonic throughout, and the diet especially nutritious and stimulating from the beginning.

PARALYSIS OF THE LARYNX.

DR. FELIX SEMON, of London, reports (*Internat. Centralblatt für Laryngologie, etc.*, Jahr. x., No. 3) a case of abductor paresis of the right vocal band in association with right-sided hemiplegia and paralysis of the right half of the soft palate in a dressmaker nineteen years of age; the attack having followed a sudden fright in December, 1890.

The argument is made, as sustained from the results of experiments upon lower animals, that the laryngeal paralysis is of bulbar and not of cortical origin, as the cortical centre presides over the voluntary act of phonatory adduction, which is not interfered with in the case, while the automatic respiratory abduction, presided over by the bulbar centre, is impaired. He calls attention, furthermore, to the very similar case reported in 1884 by Delavan, of New York, as an example of cortical paralysis, and in which the autopsy, four years later, revealed the lesion as a localized softening in the medulla oblongata, which had completely destroyed the motor nucleus of the pneumogastric nerve.

Dr. Semon likewise reported (*idem.*) a case of bilateral paralysis of the posterior crico-arytenoid muscles of more than twelve years' duration in a case of tabes dorsalis, to which bilateral paralysis of the internal thyro-arytenoid muscles had in the meantime become superadded. This latter feature he adduces as corroborative of a statement made by him in 1883 to the effect that these internal tensor muscles are the next ones after the abductors to suffer in progressive organic paralysis of the laryngeal nerves, and as evidence that the entire process is one of primary paralysis and not of primary contracture.

THERAPEUTIC VALUE OF THE VASOGENES OF KLEVER.

DR. BAYER, of Brussels, at the third annual meeting of the Laryngologists and Otologists of Belgium, June 4, read a paper on the therapeutic value of the hydrocarbons in general, and especially of the "vasogenes Klever" (*Journ. of Laryngology, etc.*, vol. vii., No. 10.)

We are not aware that these vasogenes have reached the United States; but the claims made by Bayer are so great that it is worth while to reproduce them in part, in advance of the importation or reproduction of the vasogenes in this country. These remedies are practically liquid vaselines which have been prepared by subjection to currents of oxygen which enable them to take up large quantities of various valuable remedies; menthol, 30 per cent.; iodoform, 5 per cent.; creosote, 20 per cent.; ichthyol, creoline, camphor, eucalyptus, pyoktanin, and some others. They are used by ingestion, inunction, injection, spraying, and gargling.

Beneficial results the most remarkable are claimed in a large range of diseases. The following enter into this department:

Inunctions with creosote in tuberculous patients were found not only to ameliorate the general systemic manifestations, but to reduce infiltration, cure ulceration, and dissipate perichondritis of the larynx without any topical treatment whatever. By ingestion the effects are said to be even more marked.

Nasal, pharyngeal, and laryngeal catarrhs were satisfactorily treated by frictions of the mucous membranes with vasogene of menthol, and of iodoform, of ichthyol and of creolin. In microbic diseases, sore-throats, simple, folliculous, diphtheritic, phlegmonous, etc., vasogenes of creolin and iodoform are said to exert a remarkable influence, their diffusibility and penetration into the tissues producing effects equal to those of parenchymatous injections.

Instances are narrated of beneficial effects in lymphoma, epithelioma, and sarcoma. For details and for general observation on the uses of these vasogenes the translation in the *Journal of Laryngology* should be consulted.

SARCOMA OF THE TONSIL.

AT a recent meeting of the Académie de Médecine in Paris, PROF. VERNEUIL related (*The Medical Press*, Dec. 13th) the case of a young man, aged eighteen, suffering from a malignant neoplasm, developed primarily on the left tonsil, but subsequently extending to the fauces and the base of the tongue. The tumor, which was of the size of a small orange, had only been

noticed two months previously, and gave rise to no great inconvenience, save that deglutition was a little impeded, and that the voice was nasal. Prof. Verneuil operated as follows: An incision was made from the labial commissure to the angle of the inferior maxillary, and along its edge, severing the soft parts, but not the mucous membrane; the facial artery was then ligatured. A second incision was made in the neck beneath the bone, necessitating the ligature of the lingual and external carotid arteries. Finally, an opening was made into the buccal cavity, and widened by means of a forceps, thus providing a large aperture through which the tumor could be readily reached. He then dissected it from the base of the tongue and removed it quite easily, along with the tonsil and the anterior pillar. The operation lasted forty minutes. Three weeks afterward the patient could be considered as cured, the wound almost healed, and the voice had become normal. The after-treatment consisted in the prescribing of arseniate of soda associated with magnesia.

LARYNGECTOMY.

PERIER (*Bull. de l'Academie de Med.*, No. 29) recently exhibited to the Academy of Medicine a case of total extirpation of the larynx without preliminary tracheotomy. The patient, a man, sixty-two years of age, had been affected for some two years with an epithelioma that involved one-half of the larynx, but had not extended beyond it. Chloroformization was possible despite the stricture of the larynx. The trachea was first cut off horizontally and then brought forward and upward, and a canula was inserted to continue the chloroformization. The larynx was then separated from its connections and removed entirely with the exception of the upper portion of the healthy epiglottis. The canula was then removed and the trachea sutured to the borders of the wound. The patient was beginning to speak with the aid of an artificial larynx.

MR. R. GORDON MACDONALD, of Dunedin Hospital, reports (*Brit. Med. Journal*, No. 1722) a successful case of excision of larynx, hyoid bone, and five rings of the trachea for cancer, the epiglottis being left in position.

A man thirty-nine years of age suffered from a myxo-sarcoma of the larynx, principally extra-laryngeal, but involving the thyroid cartilage, hyoid bone, upper portion of the trachea, and the soft structures in front to the level of the skin. The extirpation of the morbid growth took place ten days after a prophylactic tracheotomy.

The recovery was prompt, and after the second day there was no difficulty in swallowing. The patient speaks well with an artificial larynx.

PATHOLOGICAL CONDITIONS OF THE LARYNX OCCURRING AS SYMPTOMS OF GASTRO-INTESTINAL DISORDERS.

DR. FRANK WOODBURY, of Philadelphia, does good service in recalling attention (*Matthews' Medical Quarterly*, 1894, No. 1) to the fact that many laryngeal symptoms are but expressions of disorder in the intestinal tract, reflected to the larynx along nerve tracts which become by-paths of the disturbance. These nervous communications are duly mentioned. But still

more, the embryologic connection between the digestive and respiratory tracts is recognized as a potent factor in accounting for the inclusion of laryngeal disorders in disease and disturbances in the intestinal organs. Improper diet, too, as well as disease, it is shown, may become the factor producing disturbance in the upper respiratory tract.

We cannot too highly estimate the efforts of those who, while not depreciating specialism, indicate directly or indirectly the deficiencies of specialists who begin their career without due knowledge of general physic, and thus are liable, in their ignorance, to do harm now and then, despite themselves and their manipulative skill. The best specialist, and the safest for the patient, will always be he who has practised for several years as a general practitioner.

LYMPHANGIOMA OF THE PALATE.

THE case, from the clinic of Dr. Moore, of Bordeaux, is reported by DR. G. LABIT (*Revue de Laryng.*, etc., No. 24). A married woman, thirty-seven years of age, had long been subject to attacks of recurring sore-throat with white spots on the right side. These attacks always subsided promptly under topical applications of silver nitrate.

During an attack last year, however, the posterior portion of the throat was studded with blackish spots of ecchymosis which bled freely during deglutition. Their appearance was coincident with a hemorrhoidal fluxion. They readily subsided, with relief for three or four months, when a fresh sore-throat prompted her to consult the laryngologic clinicians of the Faculty of Bordeaux.

The patient complained of frequent sore-throat with severe pain on swallowing, and of a burning sensation in the throat, especially of evenings and upon humid days. These troubles became augmented during each entire catamenial period.

The anterior surface and the border of the right linguo-palatine fold supported a series of small yellowish-white tumors varying in volume from a pin-head to a millet-seed. They extended from the point of junction of the uvula clear down to the point of junction with the tongue. Several more occupied the internal surface of the cheek behind the large molar.

One of these tumors was punctured with the electric incandescent needle, and discharged a clear and serous liquid. Most of them were removed with cutting forceps. There was immediate relief. Occasional recrudescences, yielding to operative treatment, recurred during a number of months.

These growths were examined with great care, and a long account of the microscopic investigation is given in detail. They were evidently examples of lymphangioma.

A case of hematomylmphangioma from Dr. Moore's practice is reported. A child, five years of age, which had taken the nipple with difficulty, had always had a nasal voice, both of which impairments of function the parents attributed to an enlargement of the left side of the palate that had existed from birth. An irregular, ovoid reddish-pale tumor, the bulk of a pigeon-egg, was found to be imbedded in the soft palate and to encroach a little upon the hard palate. It so pushed the palate forward and upward as to render its

enucleation possible by dividing the posterior wall of the palate. It proved to be a *hematolymphangioma*. The microscopic appearances are described in detail.

INFLUENZA.

DR. WILLIAM ROBERTSON (*Brit. Med. Journal*, No. 1722) extols the early use of benzole, five minims every two hours or so, in mucilage, with a few drops of alcohol and spirit of chloroform, and given in lemonade to render it palatable. In this way, it is claimed, gastric irritation such as attends the use of the drug in capsules is avoided. The results, as shown by some cited cases, are prompt and effectual.

NEURALGIA OF THE NOSE.

DR. CHARLES GORIS, of Brussels, reports (*Revue Internat. de Rhin., Otol. et Laryng.*, No. 14) a case of rebellious neuralgia of the right wing of the nose cured by elongation and resection of the suborbital nerve.

LUPUS OF THE NOSE. RHINOPLASTY.

In a case of extensive lupus of the dorsum of the nose DR. CHARLES GORIS (*Revue Internat. de Rhin., Otol. et Laryng.*, No. 14) removed the diseased skin and replaced it with a flap from the forehead.

OTOLOGY.

UNDER THE CHARGE OF

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THE OSSEOUS AURAL CANAL OF THE FACIAL NERVE AND ITS LESIONS.

GELLÉ shows that the facial canal on its way from the drum cavity to the styloid foramen, crosses the posterior border of the annulus tympanicus. The point of the intersection is nearly in the horizontal plane passing through the umbo and the posterior wall of the external auditory canal. At this point the facial canal is not more than 3 mm., and often only 2 mm. from the surface of the auditory canal. This is a very important surgical consideration, as rough treatment in the canal at this point might wound the facial nerve if there were necrosis at that point.—*Annales des Maladies de l'Oreille, etc.*, Tome xx. pp. 1-43.

A CASE OF ATRESIA AURIS ACQUISITA.

DR. A. KUHN, of Strassburg (*Deutsche Medicinische Wochenschrift*, 1894, No. 27), gives an account of the above-named disease, caused by the long-con-

tinued application of a fly-blister to the auricle and meatus for the cure of chronic purulent otitis media. The patient was a girl, fifteen years old, attacked with otorrhœa in her first year. The blister was applied by the advice of a midwife, and kept up for several years. The resultant deformity of the auricle and atresia of the meatus was overcome by deep excisions of redundant cartilage and skin, and stretching the freshly cut surface of the back of the auricle to the freshly-cut surface of the mastoid, union between these surfaces maintaining the auricle against the head. The outer skin surface of the auricle was repaired by transplantation of two pieces from the patient's arm. The otorrhœa was cured by iodoform tampons after the meatus and canal were rendered patulous enough for the treatment. The hearing was greatly improved. The membrana tympani remained largely perforated.

THE BENEFIT TO EAR PATIENTS FROM NASAL TREATMENT.

IN considering this very important subject, DR. GRADLE, of Chicago, draws the following conclusions:

1. Acute suppurative inflammation of the middle ear if not treated (locally) has a tendency to become chronic, the tendency increasing with the age of the patient.

2. Chronic suppuration of the middle ear rarely heals without treatment. Neither acute nor chronic purulent otitis is influenced by nasal treatment, but the liability to relapses after their cure is decidedly lessened by the removal of naso-pharyngeal anomalies.

3. Acute catarrh of the middle ear will generally terminate in complete recovery under aural treatment, and sometimes even without it, provided there are no persistent nasal or pharyngeal lesions. But when these are present the disease is more likely to become chronic in spite of aural treatment, and in many instances can either not be cured, or if improved will speedily relapse unless the normal state of the nose and throat is restored.

4. Proliferation or adhesive disease of the middle ear is the consequence of retro-nasal catarrh, and its course is determined by the course of the disorder causing it. Aural treatment alone is practically useless in this form of trouble, while nasal treatment, if successful as far as the catarrh is concerned, will also arrest the ear-disease. The restitution of hearing, however, depends on the length of time the disease has lasted, and is often aided by ear-treatment after the cure of the retro-nasal catarrh.—*Journal of the American Medical Association*, vol. xx, No. 22.

INFLAMMATION OF THE MIDDLE EAR OF INFANTS.

DR. ARTHUR HARTMANN, of Berlin, gives the result of his and KOSSEL's investigations into this subject, undertaken at the suggestion of Koch, in the Institute for Infectious Diseases, of Berlin (*Deutsche Med. Wochenschrift*, June 28, 1894, No. 26):

1. Post-mortem examination and examination of the ears of living children establish the fact that 75 per cent. suffer from inflammation of the middle ear.

2. Inflammation of the middle ear can nearly always be detected by an otoscopic examination.

3. The symptoms of otitis media consist in restlessness, elevated temperature, and loss of weight. Sometimes these symptoms are not present.

4. Very often the symptoms of otitis media are connected with bronchopneumonic processes. Probably both processes are due to the same cause, viz.: aspiration.

5. Death can result, in cases of otitis media, from slow atrophy or from an extension of the micro-organisms into the cranial cavity (meningitis), or into the blood (septicæmia).

6. The inflammations of the middle ears of infants must receive treatment suitable for the varying conditions.

RELIEF OF CHRONIC DEAFNESS, TINNITUS AURIUM AND TYMPANIC VERTIGO, BY INTRA-TYMPANIC OPERATIONS.

During the past year much has been said and written on this important topic by BLAKE (*Archives of Otology*, vol. xxii.), C. H. BURNETT (*Philadelphia Medical News*, vol. lxiii.), GORHAM BACON (*New York Medical Journal*, April 14, 1894), and RANDALL (*Therapeutic Gazette*, February 15, 1894).

Blake's investigations have been directed chiefly toward the removal of and operations upon the stapes. His conclusions are that "it will be only as the result of a long series of carefully conducted comparative observations by different investigators that the value of the operation for the removal of the stapes can be given its proper place in aural surgery."

Burnett's operations have been directed entirely toward removal of the incus and the consequent liberation of the stapes from the impacting force of the malleus and incus. The membrana and malleus are to be left entirely *in situ*, inflammatory reaction in the tympanum being thus avoided. He has reported beneficial results, especially in relieving Ménière symptoms.

Randall in alluding to total excision of the membrane and larger ossicula says: "Excision in carefully selected instances of catarrhal deafness may be expected to aid a considerable percentage of cases, but every patient must run a decided risk of failure, perhaps disastrous" (*loc. cit.*, p. 5). Bacon in discussing total excision of the membrana tympani and ossicles, an operation now entirely discarded in chronic catarrhal deafness by the best authorities, says "we should not resort to excision of the membrana tympani and ossicles in cases of chronic dry catarrh until we have exhausted all other methods of treatment at our command."

CHOLESTEATOMA OF THE EAR.

DR. BENNO BAGINSKY reviews the various opinions and theories regarding the origin and course of cholesteatoma of the middle ear from the time of Cruveilhier and Johannes Müller to the present time (*Berliner klinische Wochenschrift*, 1894, Nos. 26 and 27).

The three opinions heretofore advanced are as follows:

1. Cholesteatomata are heteroplastic tumors and always occur as such (Virchow).

2. Cholesteatomata of the ear are products of retention, resulting either from chronic suppuration or "desquamative" inflammation of the middle ear (Von Troeltsch, Wendt, Politzer, and others).

3. A dualistic view according to which both processes are regarded as possible. After a careful consideration of the views of Lucæ, Habermann, and Bezold, in addition to those already named above, Baginsky advances the very plausible theory that as cholesteatoma of the middle ear is usually found in connection with suppuration of the ear, cholesteatoma of the petrous bone may be regarded as the *primary* affection and suppuration as the *secondary*.

The question as to the origin of cholesteatoma is still unsettled. This uncertainty of the causation of cholesteatoma in the middle ear extends also to that observed in the external auditory canal and drum-membrane.

INFECTIOUS ENDOCARDITIS OF THE RIGHT SIDE OF A PYÆMIC NATURE,
CONSECUTIVE TO A SUPPURATIVE OTITIS.

HUCHARD and LIEFFING have recorded the case of a young woman, twenty years old, who suffered from headache, fever, and anorexia for a week. Tuberculous meningitis was suspected from the family history and from the signs of softening in the apex of the right lung. In five weeks a large, retro-auricular phlegmon made its appearance and extended downward into the neck. Notwithstanding deep incisions of the abscess the symptoms of meningitis continued and increased. The patient finally died two months from the beginning of the disease. The autopsy revealed suppurative otitis media; no lesion of the mastoid cells, but a suppurative thrombosis of all the sinuses and of the internal jugulars was discovered.

Furthermore, there was found on the right side an infectious parietal endocarditis, the valve being healthy. The pulmonary infarct in this instance resulting from the endocarditis in the apex of the lung simulated pulmonary tuberculosis.—*Annales des Maladies de l'Oreille*, Tome xx., No. 1.

MYXOSARCOMA OF THE DRUM-CAVITY.

DR. A. KUHN, of Strassburg, records the occurrence of the above-named disease in a child, a boy, one year old (*Deutsche med. Wochenschrift*, July 5, 1894, No. 27). The disease made its appearance when the child was six months old, without any previous ailment, with a copious, offensive, purulent discharge from the right ear. After the running had lasted for six months the parents brought the child to the clinic of Dr. Kuhn, when there was observed a soft grayish-red tumor, the size of a hazelnut, filling entirely the right auditory canal and projecting from the meatus. Considerable thick pus flowed from the affected ear. Also, immediately below the point of the mastoid process there was a small fistula giving exit to pus, and through which a sound could be passed far inward toward the auditory canal. Further examination, after removal of the tumor from the canal with a snare, and opening the mastoid fistula, revealed the presence of a new growth, extending from the drum-cavity outward and downward through the floor of the auditory canal, which it had eroded as far as beneath the insertion of the sterno-cleido-mastoid muscle. The mastoid cavity was entirely free of pus or morbid growth. Removal of the morbid growth was followed by great improvement. The fundus of the ear could be examined, revealing total destruc-

tion of the membrana tympani, and on the wall of the labyrinth a thick, red cushion, soft and disposed to bleed, but no denuded bone, was felt.

Three months later the child was brought back to the clinic, as the tumor had grown again in the auditory canal and a similar lobulated mass had grown at the mouth of the mastoid sinus. Also suspicious masses had developed in the mastoid wound, made previously for the sake of "drainage of the ear," in the then healthy mastoid. [A doubtful proceeding.—R.] All suspicious looking tissue was removed, and after a still wider opening of the mastoid toward the drum-cavity all visible portions of the morbid growth were removed with a sharp spoon from the cavity of the ear, from the temporal region and from the posterior wall of the cartilaginous part of the auditory canal. These masses soon grew again, and the child died in two months from marasmus. No post-mortem could be obtained. There were no brain-symptoms at any time.

INTRA-CEREBRAL ABSCESS CONSECUTIVE TO SUPPURATION OF THE EAR.

A PATIENT, forty-six years old, contracted grippe in 1889. Otorrhœa set in at that time and was *neglected* for a year. It is not surprising, therefore, that at the end of this period there occurred sudden and violent pain in the temporal region, growing worse at night and attended with vertigo and syncope. The suppuration continued :

Mastoid normal. After these symptoms had continued one month there was a violent increase of pain, intense fever, and then coma.

Trepanation above and in front of the external auditory canal was followed by an incision of the healthy dura, puncture of the brain with an exploring needle upward and backward a distance of five centimetres, aspiration of thirty grammes of pus, and then a wide incision of the abscess. The temperature fell the same day, but coma persisted for three days. At the end of the first week there were some fleeting muscular contractions of the left side of the body. On the fifteenth day the patient got up, and on the twenty-fifth day the wound healed. Convalescence lasted three months.—TERRILLON (*Annales des Maladies de l'Oreille*, Tome xx., No. 1.)

[This case affords another example of the consequences of the neglect of a suppuration in the ear. Had the latter been promptly and properly treated, chronic otorrhœa could have been prevented and the cerebral abscess warded off.—REP.]

SURGICAL TREATMENT OF MASTOID DISEASE AND ITS COMPLICATIONS.

In a discussion on this topic in the Section of Otology of the British Medical Association (*Journal of the Association*, No. 1706), participated in by Drs. WILLIAM MACEWEN, WILLIAM HILL, WILLIAM MILLIGAN and W. ROBERTSON, and Messrs. VICTOR HORSLEY, HUGH E. JONES, and RUSHTON PARKER, the general consensus of opinion was that if a chronic purulent otitis media did not yield in one year to antiseptic treatment by the meatus, the mastoid antrum should be laid open and the tympanum and mastoid cavities cleaned out. No aural surgeon of experience will admit this conclusion, unless in the year of antiseptic treatment which precedes the prospective mastoid operation all necrotic remnants of the membrana tympani

and ossicula be removed. In fact, a resort to an antrectomy or mastoid opening for the cure of chronic purulent otitis media is unjustifiable until excision of the diseased membrane and ossicula with all granulation tissue and synechiæ be removed from the drum-cavity. This, without a mastoid perforation, does not always cure the chronic purulent otitis. But neither does a mastoid operation without excision of the diseased membrane and ossicula cure the chronic purulency—as every aurist knows and every general surgeon ought to know.

THE SYNDROME OF MÉNIÈRE IN CHILDREN.

LANNOIS (*Annales des Maladies de l'Oreille*, Tome xx., No. 1) states that aural vertigo in children has not received much attention from those interested in children's diseases. Especially is this the case with aural vertigo, resulting from chronic ear-disease. Lannois reports some cases in which there was an intense gyratory vertigo causing falling, vomiting, and strident noises in the ears. The causes in these cases, however, seemed different, as one was a case of chronic catarrh of the middle ear, with Eustachian obstruction, two cases of chronic suppurative otitis, with cicatrices, and one case of lesion of the labyrinth. The diagnosis must be made with great care, especially as this malady of the ear is liable to be confounded with epilepsy. The vertigo of the latter disease is not attended, usually, with nausea and vomiting; but loss of consciousness, not found in aural vertigo, occurs in epilepsy.

Aural vertigo, however, is rare in children, as is also tinnitus, a fact explained by the greater width of the aqueducts of the vestibule and cochlea in children than in adults, which prevents undue pressure upon the nervous termini in the ampullæ, the true cause of ear vertigo. Removal of the ear disease causing this disturbance cures the aural vertigo.

OBSTETRICS.

UNDER THE CHARGE OF

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HYDRORRHŒA GRAVIDARUM.

CHAZAN (*Centralblatt für Gynäkologie*, 1894, No. 5), discusses the causes of hydrorrhœa gravidarum. Although this condition has been long known, yet its nature and causation are still uncertain. It seems a symptom of several conditions; and may come from several sources. In some cases

there is a true serous infiltration of the uterine wall, the fluid collecting between it and the membranes. In other cases the decidua is the source, in others the infolded surfaces of the decidua vera and reflexa. Sometimes it seems due to a persistence of the allantoic sac. The author cites an interesting case of a healthy primipara, aged twenty-three years, who consulted him on account of excessive thirst, weakness, and breathlessness. The excessive distention of the abdomen, out of all proportion to the period of pregnancy, caused a diagnosis of hydramnios. Some time after the patient was seized with severe pains in the body and back, and on examination showed the beginning of regular uterine contractions. The pains became more intense until the following day, when a profuse watery discharge occurred from the uterus, causing it to become markedly reduced in size. The pains then slowly disappeared, and a period of rest, except for backache, ensued for several weeks, when there was a recurrence of the phenomena, with another period of rest. After the last period a lesser recurrence took place, the os dilated to the size of a dollar, the presenting head settled well into the pelvis, when another period of rest occurred.

Finally, nearly three months from the time of the first attack, the pains recurred, with a small discharge of water, followed by the birth of a healthy female child. An examination of the placenta showed the ovular envelopes scanty, the amnion extensively separated from the chorion. Besides the opening through which the fœtus passed, the amnion showed in its separated part a hole the size of a quarter, this hole having slightly swollen edges.

The author considers that this case shows that the amniotic cavity may be the source of an outflow, and the question arises whether in cases of fluid escaping from this cavity it may not escape from an opening in the upper pole due to variations in coherence, caused by changes in the shape of the lower uterine segment incident to the later months of pregnancy, or whether it can escape through an aperture in the lower pole of the ovum during pregnancy without interrupting the course of the latter. The writer is inclined to admit this latter as possible. In twin-pregnancy a second child may come very late after the first, which proves that a partial emptying of the uterus does not of necessity involve the immediate contraction.

INDUCTION OF PREMATURE LABOR BY THE USE OF GLYCERIN BOUGIES.

THEILHABER (*Centralblatt für Gynäkologie*, 1894 No. 20), contributes a description of a method of using glycerin bougies for the induction of premature labor. For two years past Pelzer's method of inducing labor by injection of sterilized glycerin between the membranes and uterine wall has been well known. While it is usually effective in inducing uterine contractions, dangerous results, such as chill, fever, violent vomiting, and evidences of interstitial nephritis or hepatitis are also reported. These seem due to the chemical irritation of the glycerin on the uterine wall, and to its absorption rather than to any osmotic action it may set up between the fluids of the ovum and itself. The hypodermatic injection of glycerin causes hæmoglobinuria and interstitial nephritis. The simplest and least hurtful method of applying glycerin to the intra-uterine sur-

face is that of glycerin bougies. These consist of a rounded thin bougie of fish-bone, covered with a thin layer of 1 per cent. of sublimate colloidin. Over this is a mixture of 5.9 per cent. glycerin and gelatin, which to prevent moulding is mixed with 2 per cent. tricresol. The bougies are packed in waxed paper that is smeared inside with 3 per cent. tricresol vaseline. Besides these, a second sort are prepared which contain as a nucleus a fifteen centimetre fish-bone, and are coated with a 7.5 gramme of glycerin and gelatin. One case is narrated of the use of these bougies by the author with excellent results, two bougies being used. How much influence the mere presence of the bougies had upon the case is uncertain, but it is believed that the glycerin greatly hastened the desired result. The small amount of glycerin used could scarcely be productive of danger.

TWO FATAL CASES FROM EMBOLISM FOLLOWING CHILDBIRTH.

FEINBERG (*Centralblatt für Gynäkologie*, 1894, No. 20) reports two cases of sudden death from pulmonary emboli following childbirth. The first case, one month and four days after labor, was seized, while walking with the nurse, with vertigo and died in twenty-five minutes. Her labor and puerperal period had been normal. At the autopsy the heart's diameter was found much increased; the musculature being soft and fatty. The right pulmonary artery from its origin to its entrance into the lung was completely filled with tough clots. The arterial intima was unchanged; the lungs were cedematous and anæmic with adhesions to the pleura. Within the arteries in the lungs numerous small particles of thrombi could be seen. A thrombosis two centimetres long, was also found in a branch of the uterine vein.

The second case, a II-para had given birth to a macerated dead fœtus. The labor had been normal, but was followed by a slight intestinal complication and some fever. On the sixth day at the urgent request of the patient she was allowed to leave the building when she suddenly fell and died in fifteen minutes.

The autopsy demonstrated that the uterus was incompletely contracted; the subserous and interstitial connective tissue of the uterine musculature were infiltrated with blood. Decolorized clots were found in the venous sinuses of the anterior and posterior uterine walls; its entire internal surface being markedly bloodstained. The placental site was covered with clots and the thrombi in its vessels continued into the uterine wall. The left vena oöphorica and the pulmonary arteries also contained thrombi. The author closes by quoting the various causes assigned for thrombosis after labor, but does not consider that any properly explain why clotting in the pulmonary artery occurs late in the puerperal period.

DYSTOCIA CAUSED BY A SUBMAXILLARY LYMPHANGIOMA.

WOERZ (*Centralblatt für Gynäkologie*, 1894, No. 5) places on record a case in which delivery was hindered by a large lymphangioma. The uterus presented an oval transversely and filled the hypogastric region distending it. The child lay in the second transverse position. The left hand and cord could be felt on examination. As the pelvis was normal, version was done under

anæsthesia and the left foot drawn to the vulva. As the labor did not advance beyond this point, extraction by the breech was attempted, but was met with firm resistance, which increased on further withdrawal. After much difficulty the right shoulder was delivered, but the left side remained hanging above the symphysis, and this was only extracted by forced elevation of the feet. The hindrance consisted in a huge foetal tumor which forced upward the whole left shoulder and a portion of which was still above the pelvis filling the inlet. The child died during extraction, which took ten minutes. Examination showed a large tumor passing beneath the clavicle and appearing about the size of a hen's egg above it. The scapula was pushed away from the ribs. The clavicle had an angular bend, and was partly separated from its sternoclavicular attachment. The mass fluctuated. The supra- and sub-clavicular cavities communicated, but they did not communicate with the pleural cavities. The tumor was a serum-containing cyst, having many small cysts around it. The surrounding subcutaneous connective tissue was œdematous. The author finds but one similar case; that of McLean, published in the *American Journal of Obstetrics*, April, 1886.

FORCEPS PRESSURE UPON THE FŒTAL HEAD.

COCQ (*Archives de Tocologie et de Gynécologie*, 1894, No. 5) presents the results of a series of investigations relative to the compression exercised by the forceps on the foetal head. An abstract of his article may be given as follows:

1. In pelves regularly or generally contracted, the application of the forceps becomes a disguised embryotomy if the transverse diameter of the superior strait or of the cavity be less than 11.5 centimetres. In these conditions version or symphysiotomy according to indications should be preferred to the forceps.

2. If the pelvis be flattened only, it is equally necessary to be very circumspect when one applies the forceps in cases when the true conjugate is less than 9 centimetres.

The forceps placed following the transverse diameter of the pelvis and the occipito-frontal diameter of the child will shorten the latter and augment the biparietal, and although the biparietal measures 9.5 centimetres at term, it ought to engage when the true conjugate has a diameter of 9 centimetres; it will only be able, however, to accomplish this by lessening considerably. The foetal head will diminish in various directions, but not without some dangers, and it is not well to assist too much with the forceps when very firm resistance to the passage of the head is experienced. It is in these cases that version or symphysiotomy offers great advantages.

TWO CASES OF SYMPHYSIOTOMY.

GAULARD (*Archives de Tocologie et de Gynécologie*, 1894, No. 5) describes two cases of symphysiotomy.

CASE I. was a primipara, twenty-one years of age, rhachitic. On examination the promontory was found projecting markedly and the upper face of the sacrum convex. It was decided to induce labor and perform symphysiotomy, as the promonto-subpubic diameter was but 9.5 cm. Dilata-

tion of the os being obtained by laminaria tents, the introduction of bougies and finally of the balloon of Champetier de Ribes, pubic section was performed and the head extracted. During the tractions the pubic separation was 6.7 cm. Episiotomy after the method of Tarnier was performed to aid delivery. After the operation the parts were united by superficial and deep sutures. The child lived and the mother made a rapid and complete recovery.

CASE II. was a III-para, aged thirty-one years, also rhachitic. Pelvic diameters were as follows: Interspinous, 22.1 cm.; crests, 22.7 cm.; promonto subpubic, 9.8 cm.; coccy-subpubic, 11 cm. The promontory was considerably lowered. On the posterior pubic face was a projecting ridge of bone, 1 cm. in length. The pubic symphysis was normal in height. The point of the sacrum was lifted and crowded backward. The coccyx was mobile. Spontaneous separation of the pubic joint after section to the distance of 3 cm., increasing to 5-6 during forceps traction. As in the preceding case, the disengagement was aided by episiotomy. Both mother and child left the hospital in good condition.

The author gives his conclusions as follows: Pubic section should not be advised in pelves of above 9 cm.; in these cases nature and the forceps will generally suffice.

The operation may be advisable in the removal of tumors that obstruct the pelvic canal, and also occasionally in cases of irreducible retroversion of the gravid uterus.

It is not advisable to divide the pubic symphysis in oblique oval pelves; rather in these cases perform pubiotomy or ischio-pubiotomy.

Symphysiotomy, though an operation sufficiently easy in a well-appointed hospital, is by no means the same in general practice in remote country places or in the homes of the very poor. Moreover, in cases of deformed pelves, waiting until full term with the view of performing section of the pubic bone then, by no means insures a living child.

In deformed pelves the dilatation is often slowly obtained or the water breaks too early. In view of the above facts the author thinks that often it is better to induce premature labor while the child is undersized or susceptible of safe delivery by the forceps and trusting for its subsequent development to the incubator and other well-known methods.

SYMPHYSIOTOMY.

FLATAW (*Münchener medicinische Wochenschrift*, 1894, No. 14) reports the case of a primipara upon whom section of the pubic joint was performed. The pelvic measurements were as follows: Diag. conjugate, 9.5 cm.; ext. conjugate, 18 cm.; interspinous diameter, 24 cm.; intercrestal, 27.5 cm. High forceps application was unsuccessfully tried. The patient showed high temperature and her pulse was 110. Section of the pubic joint was followed by considerable hemorrhage, but the operator did not stop to tie the vessels, but merely packed the wound with iodoform gauze which checked the flow of blood. The two sides of the pelvis were held in the usual manner. On section, the joint separated a distance of 4-5 cm. Extraction with forceps was easily performed. The child was deeply asphyxiated but was resuscitated by

Schultze's method; it, however, died six hours later. The periosteum and bones of the symphysis were united with two strong catgut sutures and the wound, both before and behind, tamponed with iodoform gauze. The soft parts were united by silk sutures. Some incontinence of urine followed the operation; the patient, however, made a good recovery.

THE EFFECT OF VENTRAL FIXATION ON SUBSEQUENT PREGNANCIES.

LÖHLEIN (*Deutsche medicinische Wochenschrift*, 1894, No. 11) contributes a report of two cases of pregnancy in women on whom there had been previously performed the operation of ventral fixation.

CASE I.—The patient, a III-para, on account of perineal tears and deep uterine prolapse, had had fixation done in July, 1892. In March, 1893, severe vomiting appeared, following the cessation of menstruation. In the third month of gestation the vomiting was more distressing than in former pregnancies. In September, the sixth month, one could feel bands extending from the anterior wall of the fundus uteri to the under part of the abdominal scar. Delivery occurred in December and during labor a firm band could be seen and felt extending from the top of the uterus to the abdominal wound, tightening and relaxing as the uterus contracted and relaxed.

The patient bore a healthy child and was safely delivered. At her urgent request she was discharged January 5, 1894. An examination in March, showed the uterus well restored to its normal state of ante flexion and movably fixed at a normal height. In this case it seemed as though the adhesion bands grew with the uterine enlargement and shortened again as it subsided.

CASE II. had undergone a myomectomy while pregnant in November, 1892 (she was in her second month and aborted next day). After partial resection of the uterine walls and suturing the retroflexed uterus was fixed to the abdominal wall at the point of removal of the tumor, by means of an upper and lower silk stitch. The uterine cavity was not opened. Five months later the author was called to see the patient on account of obstinate nausea and vomiting, and a pregnancy of three months was established. It progressed to a normal ending. The author concludes that ventral fixation does not interfere with the occurrence and progress of pregnancy, and although in these two cases there were early distressing nausea and vomiting, yet this may have been due to causes not dependent on the fixation. It would seem that during the gradual growth of the uterus the fixation bands also enlarged and subsequently again decreased with it in its restoration, without losing their usefulness as supports to the uterus.

A CASE OF UTERINE CALCULUS.

THORN (*Zeitschrift für Geburtshülfe und Gynäkologie*, B. xxviii., H. 1) reports the details of an interesting case of uterine calculus. The patient was fifty-five years old and a V-para, her last child having been born in January, 1873. Menopause occurred in 1886. All labors had been normal. In October, 1891, the patient noticed an irregular hemorrhage from the vagina with an intercurrent whitish flow. The disorder grew worse, and in the spring of 1892

was complicated with labor-like pains. On examination a copious bloody discharge was found. The uterus was about the proper size for a three months' pregnancy—anteflexed, very hard in consistence, but with no prominences or irregularities. The cervix would not quite admit a finger, and, on dilating this with laminaria tents under narcosis, a calculus about the size of a fist was found. It was crushed and withdrawn. Its structure was coral-like. The uterine mucosa at the fundus felt hard, corresponding to the bed of the stone, and at this place there seemed to have been a firm union, while nowhere else was there any evidence of an internal connection between the two. Portions of the hardened place and connective tissue were carefully examined microscopically and gave no signs of carcinoma. After removal all discharge ceased, and the patient improved for about a month, when the symptoms returned. Examination showed, at the hardened spot in the uterus where the stone had been attached, a crater-like depression with firm edges. An examination of tissue from this showed undoubted evidences of carcinoma, and the uterus was totally extirpated *per vaginam*. Recovery followed.

The author arrives at the following conclusions:

1. The stone is a calcified myoma. The original impulse to this calcification is found in the advanced age and sluggish circulation of the patient, especially in the hindrance to the circulation within the myoma.

The same conditions of defective nutrition in the uterus prepared a soil which, by reason of the irritation of the myoma, directly induced a malignant epithelial growth.

2. In general, the clinical picture of uterine calculi corresponds to that of myoma, with variations of intensity according to the seat and size of the tumor. For the differential diagnosis, the escape of chalky particles is useful, suggesting partial placental retention or lithopædion.

3. The only rational treatment is removal; if necessary, with precedent lithotripsy, which often has many difficulties. In abnormally firm adherence of the stone a too energetic effort at separation may cause inversion of the uterus. If the uterine wall is deeply excavated by pressure, so as to endanger perforation, total extirpation may be advisable.

GYNECOLOGY.

UNDER THE CHARGE OF

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VAGINAL CÆLIOTOMY.

DÜHRSEN (*Berliner klin. Wochenschrift*, 1894, No. 29) describes the following operation which he has performed in twenty-four cases. The cervix is grasped with a volsella and drawn downward as far as possible, and the anterior fornix is opened by a transverse incision, the bladder being freed in the usual manner. The vesico-uterine fold of peritoneum is then incised

and sutured to the edge of the vaginal wound. By grasping the body of the uterus with a volsella, or passing a suture through it, the organ can be anteverted, and with the adnexa, drawn down through the opening. The latter can now be extirpated, after breaking up the adhesions around them; myomata can be enucleated, and, if desired, the uterus can be fixed in an anterior position by suturing the fundus to the vaginal wound (intra-peritoneal vaginal fixation). In twenty-two of the writer's twenty-four cases the organ was retroverted; in fifteen conservative operations were performed upon the ovaries, the uterus and adnexa being afterward replaced. When vaginal fixation is performed, the transverse wound in the fornix is closed longitudinally in order to throw the portio farther backward; in other cases both the peritoneal and vaginal wounds are closed separately with continuous catgut sutures.

In all the cases convalescence was uninterrupted, and the uterus remained in its normal position, the patients were entirely relieved of their former symptoms and have had no subsequent disturbances. One woman conceived three weeks after her discharge from the hospital, and was at the time of the report in the sixth month of pregnancy. The advantages claimed for this method over the abdominal are safety, rapid convalescence and the absence of an abdominal wound. The intestines are not seen, there is no shock, and the risk of sepsis is minimized. The period of convalescence is so short that patients are often able to be out of bed on the ninth day, while the reaction is not greater than after a minor gynecological operation. No bandage is required, there is no risk of subsequent hernia, and intestinal adhesions are unknown. The limits of the vaginal operation should be clearly understood. It is applicable only to cases in which the uterus is so movable that the cervix can be drawn down to the vulva. If myomata are present they should not exceed the size of the first; ovarian tumors of larger size may be removed in this way, provided that they are not too firmly adherent. Diseased adnexa can be extirpated only when they can be drawn into the vagina. The operation is, however, essentially a conservative one and assumes that the uterus and one or both of the adnexa are to be preserved. When it is found that both are so diseased that it is necessary to remove them together with the uterus, the radical operation can be rapidly performed with the aid of clamps.

THE BACTERIOLOGY OF PERI-UTERINE SUPPURATION.

HARTMANN and MORAX (*Annales de Gyn. et d'Obstétrique*, 1894, No. 7,) examined pus in thirty-three cases of pelvic suppuration originating in the adnexa, with the following results: In thirteen cases the pus was sterile; in thirteen gonococci were found associated with the *bacterium coli*, where a pyosalpinx was intimately adherent to the rectum. In four cases streptococci were found, with the *bacterium coli* also present in two of these. Twice collections of pneumococci were noted, and once the colon bacteria alone.

The cases in which sterile pus was found were of long standing, though, with the exception of one of tuberculous oöphoritis, they were probably all of gonorrhœal origin. All the cases in which gonococci were found had histories of recent acute or subacute pelvic peritonitis. The influence of

previous pregnancy on gonorrhœal infection was shown in the majority of the cases, only two patients being nulliparæ. The diminished susceptibility of the latter may be due to the presence of cervical endometritis, which is so common in these cases.

In the cases in which streptococci were found there was invariably a history of septic infection (after traumatism or abortion), while the origin of salpingitis due primarily to pneumococci and colon bacteria could not be traced from the history. A special investigation to determine whether one form of salpingitis was attended with more marked febrile symptoms than another was negative.

While some varieties of pus from diseased adnexa exercise a more virulent action upon the peritoneum than others, it is practically impossible to discover any difference at the operating-table, since there is no time for bacteriological examinations after the abdomen is opened. Schauta's statistics (six per cent mortality in 216 cases) prove nothing, as he had three deaths after the removal of thirty-three pus-tubes containing gonococci, and three also in fifteen cases of pyosalpinx due to other causes than gonorrhœa. It is certain that since the contact of streptococci, pneumococci, etc., with the peritoneum is highly dangerous, the same precautions should be adopted in every case. The writers believe that by placing the patient in Trendelenburg's posture and protecting the intestines with compresses the pus can at least be confined to a small area (*foyer limité*), and instance seventy cœliotomies for inflammatory disease of the adnexa performed at the Bichât Hospital during 1893, with only one death.

With regard to the use of the drainage-tube, the writers have noted that in cases of pyosalpinx containing sterile or gonococci pus, the fluid removed from the tube remained sterile for forty-eight hours, but on the third and fourth days was secondarily infected with various micro-organisms, especially the *staphylococcus epidermitis*. After the removal of pus-tubes containing streptococci, however, these organisms were found in the drainage-tubes seven or eight days after the operation. Hence they infer that in the former cases the tube should not be left more than thirty-six or forty-eight hours, while in the latter it should remain longer.

VAGINAL HYSTERECTOMY FOR PROCIDENTIA.

HARTMANN and DU BOUCHET (*Annales de Gyn. et d'Obstétrique*, 1894, No. 1) report two successful cases, and add a list of fifty-five others by various operators. They infer from their researches that extirpation of the prolapsed uterus is not always such a simple procedure as it would appear, on account of the difficulty often experienced in detaching the bladder. Five deaths were noted, two from peritonitis and one from shock, the other two being due to renal and cardiac complications, while severe hemorrhage was encountered in several instances. It is important to remember that hysterectomy should be supplemented by plastic operations upon the vagina and perineum, since the histories of these cases has repeatedly shown that subsequent prolapse of the vaginal walls is apt to occur when this is not done. It is better to perform both operations (hysterectomy and kolpo-perineorrhaphy) at the same sitting. Ligatures must, of course, be used instead of clamps.

The main point of difference in the technique consists in the closure or non-closure of the peritoneal wound. Martin drains, then closes the wound subsequently, suturing the stumps of the broad ligaments so that they project into the vagina. Fritsch resects a portion of the vaginal fornix and closes the wound, including in it the stumps of the broad ligament.

In conclusion, the writer regards total extirpation of the prolapsed uterus as indicated whenever it is the seat of gangrene, fibro-myoma, or cancer; also in those exceedingly rare cases in which the displaced organ is irreducible. In other cases there is room for considerable difference of opinion as to its justifiability. In women who have not yet reached the climacteric ventro-fixation followed by kolpo-perineorrhaphy is preferable. In old women, on the contrary, in whom there is extensive ulceration of the cervix, total extirpation should be performed, provided that careful examination of the patients has shown that there is no existing visceral lesion (especially renal), such as would be a contra-indication to the radical operation.

PROTOZOA IN CHRONIC GLANDULAR ENDOMETRITIS.

DORIA (*Archiv für Gynäkologie*, Bd. xlvii., Heft. 1) describes a protozoön which he found constantly within the lumina of glands and in the lymph spaces of the interstitial connective tissue. He infers that the proliferation of epithelial elements is probably due to their presence. Considering the fact that glandular endometritis is closely allied to diffuse adenoma of the endometrium, and also that carcinoma is commonly preceded by endometritis, the similarity between the etiological factors, benignant and malignant conditions, becomes evident. Whether the coccidial origin of glandular endometritis is proved or not, Martin's practical observation remains in force, that the presence of this condition predisposes to malignant degeneration of the endometrium, and consequently that it should be treated rigorously by early and thorough curettage followed by cauterization. If the diseased mucosa is entirely removed, the parasites which inhabit it are usually destroyed or their irritating action is retarded. A return of the condition might be ascribed to their persistence either in the deeper tissues or in the remains of the mucosa. Since experimentally solutions of quinine seem to have a specific action upon the amœbæ, the writer suggests that intrauterine injections of the same may be profitably employed after curettage.

HEMORRHAGIC INFARCTIONS OF THE UTERUS.

POPOFF (*Ibid.*) arrives at the following conclusion as the result of a series of experiments: If both uterine arteries, both the visceral branches of the internal iliacs, and finally the abdominal aorta with the spermatic arteries be tied, there occurs a disturbance of the uterine circulation in dogs, which, however, does not lead to the formation of infarcts. The arteries and veins of the organ are dilated, and extravasation and œdema of the endometrium occur, the extent and intensity of the pathological changes varying with the number of arteries which have been ligated. The tendency to the establishment of the collateral circulation after the ligation of arteries exists to a high degree in the case of the pelvic organs.

Hemorrhagic infarction of the uterus, the writer adds, only occurs under peculiar conditions, changes in the vessel-walls being most important. The disturbance of the circulation following the occlusion of the uterine arteries, in consequence of emboli, thrombi or ligation, produces a different effect. In general, the uterus is placed under the most favorable anatomical conditions for the rapid and entire restoration of the circulation after ligation of the arteries, so that marked disturbances seldom result therefrom.

THE DECIDUA CIRCUMFLEXA IN TUBAL PREGNANCY.

FRÄNKEL (*Ibid.*) in an elaborate paper on this subject concludes that at the placental site the tubal wall is greatly thinned, so that often only the subserous connective tissue containing muscular fibres is present. In this tissue are found canals lined with cubical epithelium, the origin of which is unknown. The wall of the tube opposite to the placental site is thickened by a new development of connective tissue between the muscle-fibres. The decidua of the tube consists of two layers, one of pure embryonic tissue, and the other containing decidual cells with connective and smooth muscular tissue. No decidua is found at the point where the ovum is attached. The writer was never able to discover any trace of a decidua circumflexa. The foetal membranes are identical with those in uterine gestation.

THE CURE OF PERITONEAL TUBERCULOSIS BY CÆLIOTOMY.

MANNOTTI and BACIOCHI (*ibid.*) conducted a series of experiments in rabbits and dogs with a view of determining the influence of explorative cœliotomy in tuberculous peritonitis. In rabbits improvement was commonly noted, but never a cure; in dogs a cure was the rule. The tubercles were absorbed and were transformed into connective tissue; the absorption was apparently secondary to destruction of the virus and vascular new-formation, being most marked in dogs. In consequence of the transformation of tubercles into connective tissue troublesome intestinal adhesions are liable to form. It is only by reopening the abdomen that one can determine positively the value of cœliotomy in these cases. Though most of the tubercles are rapidly absorbed, some are slow to disappear, hence it is necessary to be careful in pronouncing a patient as entirely cured, even when the clinical symptoms are favorable. The beneficial effects of cœliotomy do not seem to be more marked when the peritoneal cavity is irrigated with sterilized water or antiseptic solutions. The observers conclude that in animals opening the abdomen causes a certain inflammatory reaction of the peritoneum, accompanied by a marked increase of its absorptive power, which results in a prevention of further infection, degeneration of cells, vascularization of tuberculous nodules, and finally their absorption and transformation into connective tissue.

THE PATHOLOGICAL ANATOMY OF THE FEMALE PELVIC ORGANS IN CHOLERA.

RUSI (*Zeitschrift für Geb. u. Gyn.*, Band vii., Heft 1) reports the results of his observations on the bodies of sixteen subjects who died of cholera. Macroscopically the uterus was extremely congested, the cavity invariably contain-

ing blood-clots. The endometrium was swollen and of a dark-red color, with numerous ulcers and extravasates. Extravasations of blood were also present in the muscular tissue. The mucosa and muscular layer of the tubes were swollen and congested, the tubes frequently containing purulent fluid. The ovaries were much swollen and contained many extravasates, varying in size from a pea to a hen's egg.

The following appearances were noted on microscopical examination: The uterine capillaries were greatly dilated and filled with blood, extravasations and round-cell infiltrations being often noted. The superficial epithelium of the endometrium was always absent, its place being occupied by a layer of blood-clot. The gland-cells were swollen and granular, the outlines of the cells being obscure; the lumina of the glands were filled with granular débris and blood-clot. The tubes presented an appearance identical microscopically with that of the uterus. The congestion and extravasation of blood in the ovaries was always more marked in the uterus and tubes. The cells of the *membrana granulosa* were granular; the ovum was so swollen as to almost fill the Graafian follicle, which was so granular that the *macula germinativa* could scarcely be seen. In cases that had had a more subacute course, the epithelial cells of the uterus showed more marked degenerative changes, the vessel-walls were thickened and showed hyalin degeneration.

Various cocci and bacillary forms were seen, but Koch's bacillus was not found in any of the specimens.

PÆDIATRICS.

UNDER THE CHARGE OF

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SEVERE BROMIDE ERUPTION IN AN INFANT.

JONATHAN HUTCHINSON (*Medical Press and Circular*, 1894, vol. cviii, p. 325) records a severe eruption in a child of fourteen months, who had received from two to six grains of bromide of potassium every four hours for three weeks. The eruption consisted of thick tuberculous papules on the face and limbs, but not on the trunk. Those on the legs were ulcerated and covered with thick pus crusts.

HYDATID OF THE BRAIN IN A CHILD.

O'HARA (*Intercolonial Quarterly Journal of Medicine and Surgery*, 1894, No. 1) records the case of a boy aged six years, who had been seized a year previously with severe pain in the left side of the head, accompanied by vomiting and giddiness; the pain persisted, and he lost flesh. After a convulsion last-

ing about two hours he was found to be paralyzed on the right side and quite blind. Sight was regained in three weeks; and there was some return of power in the leg, and ten days later in the arm. It was then noticed that the left side of the head was larger than the right. General health began to improve, but the headache persisted, being worse at night. On examination there was slight prominence in the left parietal region, with distinct œdema of the scalp overlying it, and tenderness to pressure; double optic neuritis, more marked in the left eye; deafness on the left side; slight aphasia, and weakness of the right hand and arm, but sensation was unaffected.

An incision was made over the region of the fissure of Rolando, and a wedge-shaped piece of bone removed. The dura bulged into the opening, and on being incised gave issue to about six ounces of hydatid fluid, with numberless daughter-cysts. The mother-cyst was removed, and the cavity washed out with boiled water. The cyst appeared to have been originally partly cerebral, partly meningeal; adhesions had prevented the passage of fluid to the base of the brain. The cavity was drained and dressed in the usual way. Recovery was uninterrupted, and the neuritis completely passed away.

ARTICULAR COMPLICATIONS OF DIPHThERIA.

UNDER this title BERNARBEIG (*Thèse de Paris*,¹⁸⁹⁴) considers an exceedingly rare complication of diphtheria, basing his study upon ten cases, several of which came under his own observation.

This joint affection appears usually at a time when the angina is cured or greatly ameliorated—that is, generally between the seventh and the fifteenth day after the onset of the disease, but occasionally at a more distant period. The joints affected are always the larger ones, most often the knee, which is a favorite site for other infectious arthritides. The milder forms occur with benign anginas which have ended in cure, while the grave, suppurative cases occur with the severe forms of the disease.

Suppurative arthritis occurs with the other symptoms of a generalized, pyæmic infection: high fever, agitation or prostration, albuminuria, diarrhœa, vomiting. The usual termination is death.

Simple non-suppurative arthritis is divided by the author into three groups: (1) the purely arthralgic form, where there is only violent pain, without local modifications or general phenomena; and the arthralgic form with local swelling, redness of the skin, and local elevation of temperature; (2) the serous form, equally painful, and not distinguishable from the preceding excepting by the existence of serous effusion; (3) the peri-articular form, where the pain is less acute and there is a spongy peri-articular swelling.

As to the pathogeny of these inflammations, the author classes the purulent cases as instances of secondary infection, most often by streptococci, which have been found in all the cases except one, where there was an association of two microbes. For the non-suppurative cases the author is less positive, asking if they are not produced by diphtheritic toxins, as is suggested by the absence of microbes in the fluid of the joint; by the appearance of these inflammations at a time when toxins have had opportunity to form and invade the organism; by the quite frequent coincidence of paralysis with the appearance of these articular complications; and, finally, by experiments

upon rabbits, which show that toxine can provoke an inflammation of serous membranes, like the pleura.

A STUDY UPON THE CONVULSIONS OF CHILDHOOD.

In a communication to the International Congress of Rome, CORNÉLIE CHENBACH of Bucharest (*Revue mensuelle des Maladies de l'Enfance*, September, 1894, p. 451) presents a clinical and experimental study upon this very common but little understood complication of many diseased conditions of early life. Following the earliest experiments of Feltz and Ritter, and the more recent ones of Bouchard, the author has carried out a series of experimental studies by injecting the urine of epileptic subjects into the circulation of the rabbit. The conclusions of this portion of the work are as follows:

1. The urine of convulsive affections, filtered and introduced into the circulation of rabbits, produces clonic and tonic convulsive manifestations.
2. These convulsions appear more rapidly, and are more violent than those produced by normal urine.
3. Prolonged boiling diminishes in part the toxicity of the urine, and modifies the toxins contained in it.
4. The presence of convulsivant substances in the urine of convulsive affections appears to be proven.
5. Bromide of potassium employed in the treatment of such affections, being introduced into animals with the urine containing it, diminishes or even prevents such convulsions.
6. In convulsive affections of children the urine shows a more energetic and prompt action than that of adults under the same conditions.

In the clinical study especial attention is paid to the convulsions appearing in the course of the infectious diseases. Briefly, the results are thus summed up:

1. It is to be admitted as probably the fact that convulsivant substances are found in the organism and produce auto-intoxication.
 2. Such auto-intoxications give the most satisfactory explanation of the production of convulsive phenomena in children during or following infectious diseases.
 3. Alterations in the liver, by diminishing its antitoxic activity, favor auto-intoxication, and, consequently, the appearance of convulsions.
-

TREATMENT OF CHOLERA INFANTUM BY LARGE DOSES OF WATER.

JULES PARA (*Revue mensuelle des Maladies de l'Enfance*, September, 1894, p. 479) reports five cases of cholera infantum treated successfully in accordance with the plan of Luton, of Reims, and Rémy, of Nancy. He believes that by this method almost all children affected while in good health may be saved if seen by the physician sufficiently early. In accordance with Rémy's method, in the beginning of the treatment all food is interdicted, this restriction to be maintained for a number of hours, according to the strength of the child and the intensity of the disease. Then, to answer the immediate indications, to calm thirst, cleanse the digestive tract of the poisonous substances which it contains, and to restore to the blood the liquid lost, and re-

establish normal blood-pressure, water is prescribed. Plain water, however, is not suitable, nor is an acidulated solution. A feebly alkalized and sparkling water, like that of Soultzmatt or Vals, has proved most acceptable. At first, small doses are given, frequently repeated, as long as thirst is evident; and in this way, in a few hours, a quarter, half, or even an entire litre may be taken. When the gastric intolerance is extreme, the first doses are rejected; but this irritability will soon subside under persistent administration. The cry, which indicates the sufferings of the organism deprived of water, quickly ceases, and a period of quietude supervenes. Under the influence of the absorption of water into the blood the circulation is re-established and all the alarming symptoms subside. While, however, the child is thus saved from its impending peril, the success of the case naturally depends upon the subsequent treatment, which is carried out by the cautious administration of well-diluted sterilized milk, increasing the strength of the mixture gradually until the pure milk can be borne.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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CHOLERA: A FATAL CASE FROM LABORATORY INFECTION.

It will be remembered that the experiments of Von Pettenkofer relative to the etiology of cholera, in the course of which he swallowed a considerable quantity of a bouillon culture of the specific bacilli with the effect of inducing only a moderate degree of gastro-enteritis, led him to the conclusion that the germs alone were incapable of producing true Asiatic cholera (Cf. AMERICAN JOURNAL OF THE MEDICAL SCIENCES, March, 1893, p. 355). This conclusion was at the time disputed by the Berlin school of bacteriologists, by whom it was suggested that Von Pettenkofer had in reality suffered from a mild attack of cholera, and that, in any event, one case of positive infection would outweigh many negative experiments. The positive, unquestionable proof has at last come to us in the case of Dr. Oergel, Assistant at the Hygienic Institute in Hamburg, who died recently from cholera acquired by direct infection while experimenting with pure cultures of the cholera bacilli. Details of the case are reported by REINCKE in the *Deutsche medicinische Wochenschrift*, 1894, No. 41, p. 795.

The exact manner in which the infection occurred is not definitely known. Oergel was known to have on several occasions met with accidents in handling the cholera cultures with which he was working, and on one occasion he inadvertently sucked up through a pipette some of the peritoneal contents of a guinea-pig which had previously been inoculated with a virulent culture. Immediately after this he began to have diarrhea, which proved

intractable, and was followed in two or three days by a typical asphyctic stage of medium intensity, but with severe and prolonged muscular cramps. Vomiting and diarrhoea continued despite all efforts to stop them, and infusion soon became necessary. His strength gradually failed, a comatose condition supervened, with signs of a lung complication on the seventh day, and on the eighth day he died. Throughout the entire course of the disease cholera bacilli were abundant in the stools, their presence and numbers being apparently uninfluenced by treatment. The diagnosis of cholera was substantiated by the result of the autopsy.

This case should serve to forcibly impress upon all those making use of cultures of the cholera bacillus the necessity of the greatest caution. It is indisputable proof of the etiological relationship of that germ to Asiatic cholera.

GANGRENE OF THE LUNG.

A CAREFULLY studied case of gangrene of the lung is reported by REINBACH (*Centralbl. f. allg. Path.*, 1894, v., No. 15), in which an emphysematous condition, supposed to have resulted from a previous whooping-cough, would appear to have afforded the conditions necessary for an invasion of the tissue by the bacteria. The patient was a child, thirteen months old, which had appeared well, though not very strong, until attacked with pertussis. Soon after recovery from this, and two weeks before its death, slight fever and a roseola-like eruption were noticed, which lasted only two days, and the child again appeared well, when suddenly it was attacked with great dyspnoea and died soon afterward.

Autopsy showed the lower lobes of both lungs to be softened and of a chocolate color, distinctly gangrenous. The upper lobes were aerated, but scattered through them were several small cavities about the size of peas, with smooth, reddish edges. There were no tubercles and no particular change in the bronchi. Nor were there any other lesions in the body. Microscopical examination showed the substance of the lower lobes to be intensely necrotic, the degenerated areas and the bronchi being filled with bacilli closely resembling in their morphology the *bacillus anthracis*. None of these bacilli were found in the bloodvessels. Cultures could not be made, as the specimens were brought to the laboratory in alcohol.

The upper lobes were essentially normal in structure, with the exception of the cavities above referred to. These were destitute of epithelial or other lining and appeared to have been formed in the connective tissue of the lung by pressing apart its fibres. They therefore presented the appearance of "interstitial" emphysema. Their walls were thickly covered with bacilli similar to those found in the necrotic areas and bronchi of the lower lobes, and the inference is that these germs found their way through the bronchi into the emphysematous spaces, where the lowered vitality of the tissue afforded the necessary condition for their growth.

THE DETECTION OF TUBERCLE BACILLI IN SPUTUM.

WHEN tubercle bacilli are present in the sputum in large numbers no particular difficulty attends their detection in ordinary cover-glass smears and

staining with carbolic-fuchsin, nor has any method been as yet devised which offers surer results or greater economy of time. But when present in small numbers they may escape detection by this method, and treatment of the sputum is necessary to admit of the separation of the bacilli from the tenacious mucus. To accomplish this VON KETEL (*Archiv. f. Hygiene*, xv., 1894; Cf. *Fortschr. d. Med.*, 1894, No. 18) recommends shaking with carbolic acid, which causes a fine flocculent precipitate, which quickly settles, bringing down with it the tubercle bacilli. Comparative tests of this method with that advocated by Biedert, in which solution of the mucus is accomplished by the addition of caustic potash to the sputum, showed von Ketel's method to yield both quicker and more accurate results.

The method as proposed by von Ketel is as follows: Ten cubic centimetres of distilled water and 6 c.cm. of liquefied carbolic acid are shaken together in a flask, and when thoroughly mixed 10 to 15 c.cm. of the sputum are added, the flask is plugged with a rubber stopper and is vigorously shaken for about a minute; 75-80 c.cm. of water are then added and the whole is again shaken, after which the mixture is poured off and allowed to stand in a conical glass for twenty-four hours, or is settled by means of the centrifugal machine. Cover-glass preparations are then made in the usual manner and stained by the carbolic-fuchsin method.

When milk or other fat-containing substance is examined by this method it is necessary before staining to immerse the cover-glasses in ether, to remove any fat which may be present.

TUBERCLE BACILLI IN BLOOD.

At the meeting of May 7, 1894, of the Verein für Innere Medicin, in Berlin, KRÖNIG reported the finding of tubercle bacilli in the blood of a person who had died of acute miliary tuberculosis (Cf. *Deutsche med. Woch.*, June 14, 1894, *Vereins-beilage*). As tubercle bacilli are usually difficult of detection in the blood, he describes the method employed and recommends it highly. A few drops of the blood were thoroughly shaken with about 10 c.cm. of distilled water until a brownish-red transparent liquid resulted. This was then settled by means of the centrifugal machine, and the sediment was examined for tubercle bacilli by the ordinary method. In all of four cover-glasses made and examined by Krönig bacilli were found.

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